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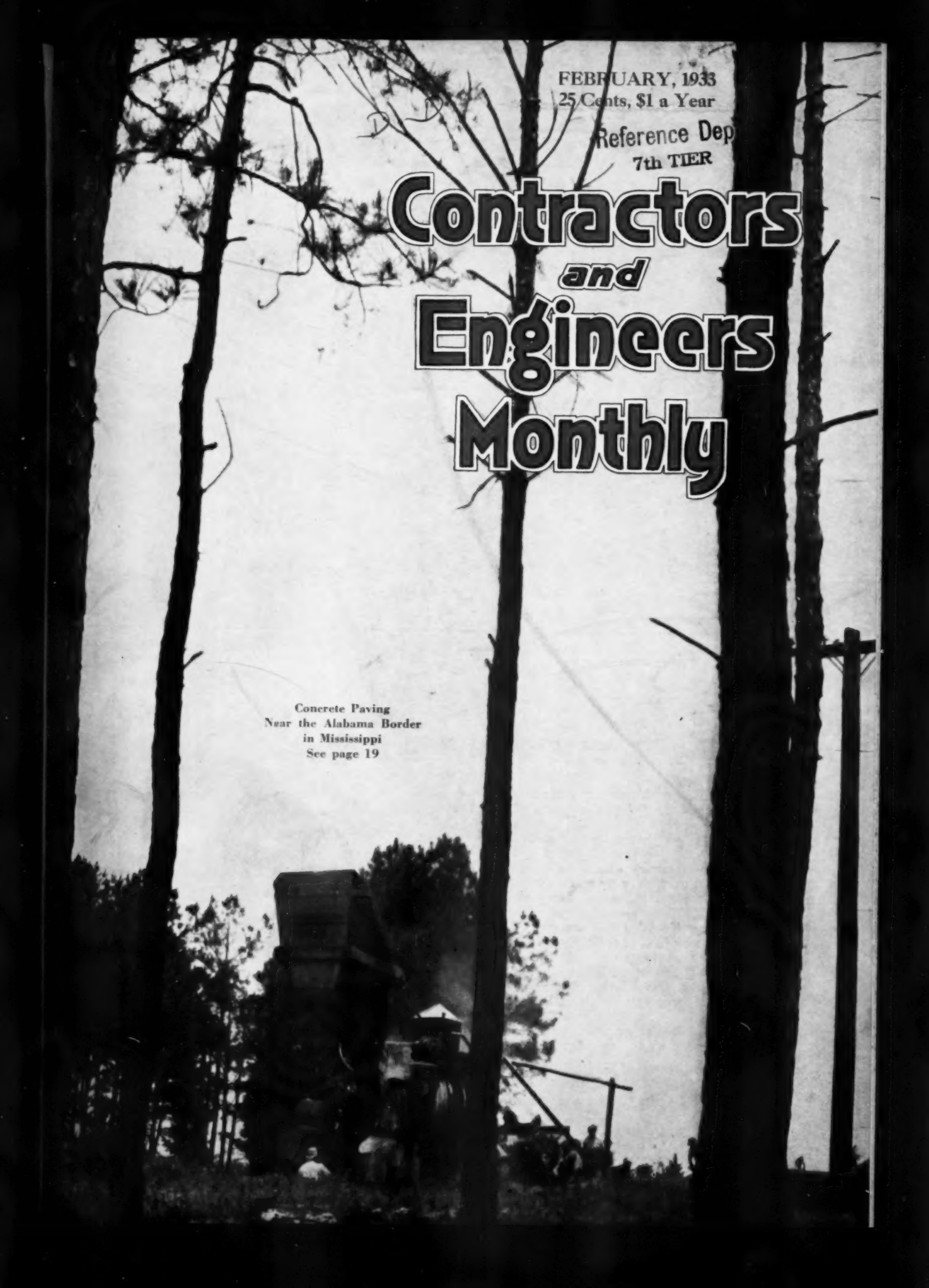
Contractors and Engineers Monthly

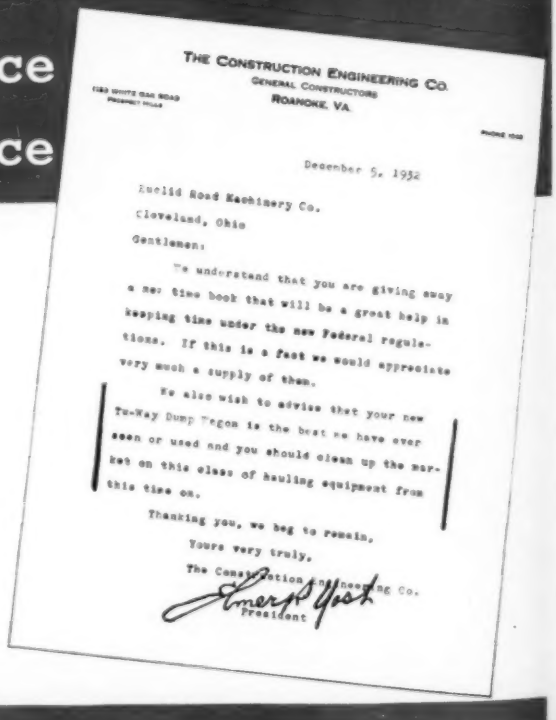


Concrete Paving
Near the Alabama Border
in Mississippi
See page 19

ROCKS or sticky DIRT

. . . it makes no difference

TU-WAY Evidence of Super Performance



THE CONSTRUCTION ENGINEERING CO.
GENERAL CONSTRUCTORS
ROANOKE, VA.

December 9, 1932

Euclid Road Machinery Co.
Cleveland, Ohio
Gentlemen:

We understand that you are giving away a new time book that will be a great help in keeping time under the new Federal regulations. If this is a fact we would appreciate very much a supply of them.

We also wish to advise that your new Tu-Way Dump Wagon is the best we have ever seen or used and you should clean up the market on this class of hauling equipment from this time on.

Thanking you, we beg to remain,
Yours very truly,
The Construction Engineering Co.
President

HERE'S graphic evidence of what the new Euclid Tu-Way Wagon is doing in the field to lower costs and speed up operations. The above photograph, taken under actual working conditions, shows a capacity load of big rocks being dumped with speed and ease impossible with ordinary dump wagons or trucks . . . proof that here is a wagon designed for super performance. Now read the letter from a contractor using Tu-Way Wagons on a West Virginia Highway job . . . certainly only equipment that gives revolutionary service would bring such enthusiastic comment. Whether it is a job of moving rocks, gravel or dirt it makes no difference, you are interested in doing it at the lowest possible cost. It will pay you to contact with your Euclid Dealer or write us direct for the complete story on the new Tu-Way.

THE EUCLID ROAD MACHINERY COMPANY

CLEVELAND OHIO

Saving *through* Electric Welding *on* New Independent Subway System New York City

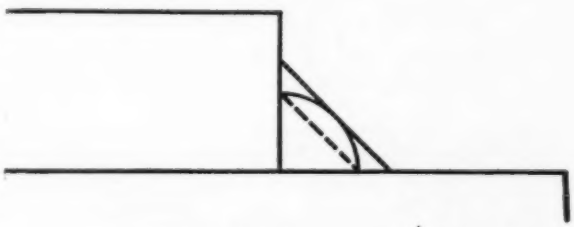
By
W. G. Theisinger
Assistant Engineer
Board of Transportation
New York City

IT is claimed that more than a quarter of a million dollars has been saved through the use of electric welding in the new Eighth Avenue subway, New York City, recently completed and placed in service on September 10, 1932. This is an important branch of the City's Independent System which begins at 270th Street in the upper Bronx, continues through Manhattan and is extended under the East River to Brooklyn and Queens, serving all the important residential sections of the metropolis. The advent of electric welding in subway construction was beset with a great deal more than mere structural difficulties. Engineering minds trained in riveting and bolting did not readily accept that which on first demonstration has the appearance of soldering. They look for stitch connections across joined members and when splice-joined structural shapes are held together by a bonding along the perimeter of the splice plates, they doubted the efficiency of the joint.

The testing of welded specimens was taken from the laboratory to the work. Beams splice-welded on the work were broken apart with hydraulic jacks. The Board of Transportation finally specified a reinforced weld bead. The strength of the bead is rated according to its thickness through the throat. This differs from the usual practice adopted in straight fillet welds where the size is indicated by the height of metal in contact with the base members. With the reinforced weld the bead is strengthened at a recognized point of weakness.

Design and Theory

The throat of the weld is taken as a line which bisects the angle formed by the base members as set when making a fillet weld. In a ½-inch straight fillet weld, the thickness through the throat is only 0.3535 or 11/32 inch. Since the plane of greatest shear is along the throat, the area of the throat of the weld determines the strength of the weld. A ½-inch reinforced weld measures ½-inch through the throat and practically gives a strength equal to an 11/16-inch straight fillet bead, assuming the metal in both welds homogeneous and of uniform quality. A comparison of the reinforced weld with straight fillet types is shown below. The dotted straight line is the standard ½-inch straight fillet, the curved line is the reinforced ½-inch fillet bead, while the full straight line is an 11/16-inch straight fillet weld.



A Comparison of the Reinforced Weld with the Straight Fillet Types. The Dotted Straight Line Is the Standard ½-Inch Straight Fillet, the Curved Line Is the Reinforced ½-Inch Fillet Bead and the Full Straight Line Is an 11/16-Inch Straight Fillet Weld.

The reinforced bead effects a saving in time and deposited metal due to the lesser amount of weld metal required. A comparison of the cross-section areas will show this:

Size of Bead	*Area*
½-inch straight fillet	0.1250
½-inch reinforced fillet	0.19635
11/16-inch straight fillet	0.23635

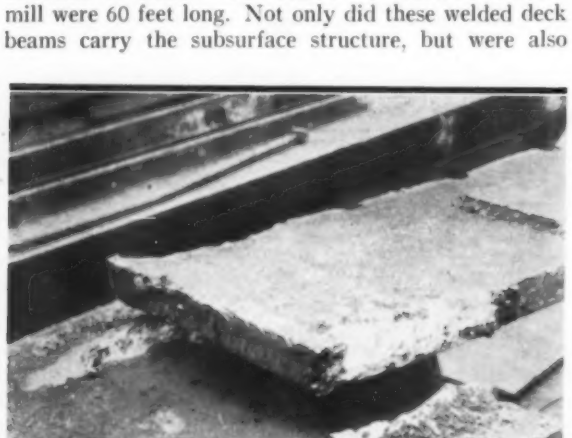
For an increase of 0.07 square inch of bead, the strength is increased the equivalent of a difference of 0.11 square inch. The resultant saving by the use of a reinforced weld is 0.04 square inch in cross-sectional area. Distribute this difference over thousands of linear feet and a considerable saving is effected.

TESTS CHECK THEORY

From a great number of tests conducted by the American Welding Society and by the Board of Transportation, it was found that a ⅜-inch straight fillet weld had a shear strength of 12,000 pounds per linear inch and a ½-inch straight fillet weld tested at 16,000 pounds per linear inch. This led to the conclusion that each ⅛-inch increase in the size of bead would increase the strength 4,000 pounds per linear inch until, of course, a critical point is reached where this increase is no longer true. It must be remembered that the usual safety factor of four is based on the above figures for engineering uses. Consequently the strength of an 11/16-inch weld was estimated at 22,000 pounds per linear inch. Thus if the claims for the reinforced weld are to be upheld, the ½-inch reinforced weld must likewise have this strength. After making twelve splice beam tests it was found that the ½-inch reinforced weld had an average value of 25,000 pounds per linear inch. Only one specimen dropped as low as 22,000 pounds per linear inch and one attained 27,500 pounds per linear inch. The reinforced weld was adopted and was used by the Board of Transportation in its specifications and requirements for welding on the new Independent System for both field and shop fabricated work. The Board in its future work will specify straight fillet welds.

PRACTICAL APPLICATION

Most of the welding done in this subway construction was the splicing of 27 and 36-inch I-beams used to carry the temporary street decking while excavating was being done below the street level. There were three lines of these beams, two at the curbs and one in the middle of the street. During the first excavation, the street surface was removed to a depth of 5 feet. A board decking was laid flush with the old street surface on the I-beams, which were placed longitudinally or with the direction of traffic. The beams as received from the mill were 60 feet long. Not only did these welded deck beams carry the subsurface structure, but were also subjected to the shock and vibration of the usual heavy vehicular traffic, including street cars, motor trucks of 10-ton capacity and automobiles, etc. Water lines, sewers and duct lines were suspended from the roof during the excavation beneath the street surface.



A Close-Up of the Fractured Weld of a Test Specimen

A type of splice employed by one contractor uses a large single top splice plate. This plate was welded along the whole perimeter of the plate and was usually 48 x 14 x 1 inches. These dimensions allow 1 inch on each side of the plate for welding as the flange of the beams was 16 inches wide. All welding was done "downhand."

The web plates were 16 x 8 x ⅜-inches and were welded all the way around. A plate was welded on each side of the splice in the webs, using a ⅜-inch reinforced weld. The sides were welded vertically, the top by "downhand" whereas the bottom edges were welded by what may be termed an "overhead" weld.

The bottom splice plate was 60 x 18 x ⅞-inch which leaves an inch on each side of the beam for welding. This arrangement is made for downhand welding as the old method of doing overhead welding across the beams at the ends of the plate did not give satisfactory results. The plates were lengthened in order to give the required amount of welding. This design is now standard practice, which is the result of at least three years of trial and experimental work.

TEMPORARY WELDING DONE BY SUBCONTRACTOR

The splice connections were handled by a welding company which was a subcontractor to the general contractor for a particular subway section. The 36-inch I-beams were welded at a contract price of $28 per joint. In a bolted connection, which was the method employed prior to the adoption of welding, the cost to the contractor was $100 for each joint. The beams were sent from the rolling mill to a fabricating shop where the bolt holes were drilled in the beams and splice plates, after which they were shipped to the subway contractor and joined by structural iron workers. A further saving was realized with welding as the I-beams can be removed after the permanent structure is in place and the whole beam may be used again on another contract. With bolted connections the drilled ends must be cut off and new holes drilled to fit the design on a new contract. This means shipping the beams back to a fabricating mill for this operation.

SOME COST DATA ON TEMPORARY CONSTRUCTION

One can only base the savings on the estimates and bids of the contractors. The welding subcontractors bid $28 for welding and bolting cost $100, since from 100 to 140 bolts were used on each joint. With four iron workers at the prevailing wage rate, together with the shop costs of drilling, this figure is substantiated. The difference in cost between the bolting and welding of center beams, therefore, is $72 for each splice.

The curb beams were welded for $15 per splice whereas bolting costs $85, resulting in a saving of $70 on this particular type of operation. The gross saving in the welding of deck beams amounted to about $14,000 for each subway section as there are between 190 and 200 splices in each section. The total savings in

subway construction for fourteen sections was nearly $200,000 for the welding of deck beams alone.

WELDING ON PERMAMENT WORK

Welding also effected other economies in permanent work. The welding of cap and base plates to the supporting columns in the subway is a simple type of fabrication but its success will be a basis for the advance of welding in other types of fabrication. Welded caps and base plates were used with the vertical H columns. The base plates were 18 x 18 x ⅜-inch but most of them were from 1½ to 3½ inches thick. The cap plates measured 14 x 10 x ⅜ inches and were welded to the top of the columns by a ⅜-inch reinforced weld. Welding has eliminated four connection angles together with the drilling, laying out and fitting of the plates. Drilling of the columns also was obviously unnecessary with welding. Since manual labor is a costly part of fabrication. the easy manner in which these columns were handled for welding further demonstrates the advantages of this type of design.

In welding cap and base plates to columns, the H beams cut to length were placed on cradles with the web in a vertical position. The flanges were then horizontal to the cradle and likewise with the floor. The plates were marked by the layer-out and were "tacked" to the column. All welds were made by "downhand" welding and without turning the column. By the old method the welds were deposited on the outside of the column in contact with the plates, which required turning the column. The only difficulty encountered in welding these members was the tendency of the plates to warp and draw the ends inward toward the shaft of the column. This difficulty was overcome by cambering the plates away from the shaft prior to welding so that the construction of the heated area would straighten the plates at right angles to the column.

SAVING IN COSTS ON PERMANENT CONSTRUCTION

A fabricating company stated that the welding of the cap and base plates effected a saving of 50 per cent of the cost of fabrication over riveting. This resulted in a saving in materials and labor of $2.50 for each column. These columns are spaced at 5-foot intervals and there are about 790 of them in each line making a total of 2,370 columns to a section. The gross saving per section, therefore, was approximately $6,000 for this item alone. There were ten subway sections welded during the past year, making the total saving of $60,000 in the welding of cap and base plates alone.

OTHER USES OF WELDING ON SUBWAY SYSTEM

One subway contractor, who had to support the Fulton Street elevated line during the subway construction below, built stilts of welded angle construction for the elevated columns. The road bed of the subway is 35 feet below street level and the elevated road bed is 30 feet above that, making the total length of the supporting columns 65 feet. The welding of this structure proved to be an aid to the contractor in finishing his section far in advance of the scheduled time.

The value and safety of welding was conclusively demonstrated in a cave-in of the sidewalks on the 14th Street Crosstown Line near Eighth Avenue. A portion

Welded Columns Showing Method of Setting Bases in Concrete

of the sidewalk on either side of the street was thrown into the subway excavation due to the undermining of the supporting piling by rains. As the debris slid into the subway cut, four of the supports for the deck beams were loosened and dropped away from the beams. This meant that a continuous span of 70 feet with a welded splice near the middle of the span was unsupported. Traffic on the affected area was immediately suspended and inspection showed that the deck beams were unharmed as they held the street surface while the supporting timbers were being replaced.

The following is cited to show that welding can be subjected to rather severe shock without failing. In this particular instance, a deck beam was being carried but 6 inches above a rock formation which was being blasted out by dynamite. Each blast caused the beam to jump up about 2½ inches from its normal position after which it would settle back into place. A series of blasts with the subsequent vibrations in the beam caused the bottom plate to fracture. The weld held until the plate had completely failed.

ACKNOWLEDGMENT.—This article is based on a paper by W. G. Theisinger, Brooklyn, N. Y., Assistant Engineer, Board of Transportation, New York City, which was awarded a $100 prize in the Second Lincoln Arc Welding Prize Competition, sponsored by the Lincoln Electric Co., Cleveland, Ohio.

Book of A. S. T. M. Tentative Standards

THE Book of Tentative Standards is issued annually by the American Society for Testing Materials. Each year it includes all of the tentative standards in effect at the time of publication. The 1932 edition contains 226 tentative specifications, test methods, definitions of terms and recommended practices in effect in October, 1932. Of this number, 47 were accepted for publication for the first time in 1932. Copies of this publication, comprising 1,236 pages, bound in blue cloth, may be secured from the American Society for Testing Materials, 1315 Spruce St., Philadelphia, Penna., at $8.00 a copy. Copies in heavy paper binding are $7.00.

Underpasses Built Easily *by* Special Tools *and* Methods

By

Max L. Cunningham

Chief Engineer and General Superintendent

John W. Fox

General Railroad Contractor

El Reno, Okla.

WHEN the Rock Island Lines and the Frisco System constructed their joint passenger station at Oklahoma City, Okla., it was necessary to build subways or underpasses at either end of the passenger platforms, on Robinson Avenue and Walker Avenue, to separate street and railway traffic. Street traffic was badly congested at this point, owing to the large number of tracks crossed at grade and the excessive number of train movements through the station. On the crossing at Walker Avenue, it was necessary to depress the double track line of the Street Railway Co. which also carried a heavy interurban traffic. Work on this job was badly slowed up by the large number of interurban car movements.

On the Robinson Avenue subway, there is a continuous single-track roadway, 36 feet clear between curbs, and a sidewalk 6 feet in width in the open section and 8 feet wide in the tunnel section on each side. These walks are carried by the back walls and by a curtain wall separating them from the roadway. As the walks are on a flatter grade than the pavement they are considerably higher than the roadway at all points. The walks are separated from the roadway pavement for their entire length by a concrete hand-rail. Both the back retaining wall and the inner curtain wall supporting the walk and hand-rail are carried on a wide reinforced concrete foundation which forms the base of the cantilevered retaining wall of the approach sections and for the box abutments which carry the I-beam slab deck for the tracks.

Foundation Excavation

The industrial buildings on both sides of Robinson Avenue, both north and south of the railroad right-of-way, were obsolete, being the oldest buildings of that type in the city and erected on poor and shallow foundations. This, with the fact that the excavation for the tunnel section carrying the interurban tracks was finally in quicksand, made it necessary to carry the abutment walls and three of the 39-foot 6-inch approach panels on each side on timber foundation piles, driven in a cofferdam of steel sheet piling supporting the earth below the building foundations until the walls were backfilled.

To hasten this work the contractor excavated a trench on the line of the sheet pile wall with a Parsons trenching machine to a depth of 17 feet, which was the elevation of the sand, and a width of 30 inches. This trench was braced as dug and the sheet piles and waling set and braced in place. The excavation was done at once between the piling walls, bracing as the work was done. The excavation was handled with a clamshell bucket and a P & H crane, which also set the timbers. When the excavation was completed to the bottom of these pilot trenches, the steel was driven to a depth of about 6 feet below the pile cut-off, the excavation completed and the foundation piles driven.

Since all of the excavated material had to be wasted in the railroad yards, with a haul of approximately one-half mile, it was all moved in trucks and handled from the top, so that the approach walls were built in trenches, slightly wider than the foundation measurements, thus retaining the pavement in the center of the street for the contractor's operations and permitting hauling on level ground. Through the tunnel section on the right-of-way, the railroad abandoned five tracks and handled their trains with the remaining six which were placed on piling falsework using I-beams which were afterwards placed in the permanent deck, for stringers. All of the tunnel section was excavated by machine with dragline or clamshell in open cut with adequate slopes. The contractor erected a pile trestle at railway grade through the center of the work, connecting at either end with the pavement left in place in the approach sections and planked across the railway falsework. All excavating, pile handling, driving and pulling, and handling of concrete to place in the

forms was done with the contractor's three P & H machines which were in this way able to move and work through the entire length of the job and could be separated or concentrated at will wherever needed. So flexible was this arrangement that operations were carried on night and day, across the double-track main lines of two railways, and at the mouth of a terminal passenger station, without delay to any regularly scheduled train.

SECTIONAL FORMS

The railroads required exceptionally well finished work, owing to the prominent position of the underpass, and in consequence the form work was particularly well planned. All forms, except where bracing was left in place, were built on top, in sectional units, separately designed owing to the fact that three grade lines had to be considered on each section of approach wall. The roadway descended on either a vertical curve or an 8 per cent grade, the sidewalk was on approximately a 6½ per cent grade or a vertical curve and the top of the wall sections were graded up toward the right-of-way to permit drainage for the pavement laid behind the walls and across the street to accommodate abutting property. All unit forms were used twice, it being necessary only to reverse two sections for right and left placing. The forms in all cases were built of low-grade common sheathing unmatched but the back forms were built as tightly as possible with this material and forms for exposed surfaces were lined with ¼-inch fir plywood, dipped in hot oil before being shipped. The plywood was removed as soon as the forms were pulled, cleaned, re-oiled and used again as soon as possible, as many as five uses being obtained in this way. Special forms for the capitals designed by the contractor were built in a planning mill, requiring sixty-two on this job and sixty-six on the Walker Avenue underpass. These forms were built in four matched sections of selected white pine, lined with birch and were cleaned and oiled before being reused. Four sets of forms built all the capitals, without delaying the work, and were in good condition even at the finish of the job.

HAND-RAIL FORMS

The contractor also designed and built with his own forces the forms for the self-supporting reinforced concrete hand-rail along the top of the retaining walls and between the sidewalks and the roadway. These were built in approximately 10-foot sections, made of selected lumber, planed and finished, thoroughly bolted together and were given four coats of white enamel before being used, and brushed and oiled after each use. By building in short sections it was possible to erect 2,900 linear feet of this rail, on all grades encountered and on vertical curves, with 120 feet of wall forms. This was made possible by casting the spindles in place, plumb in all cases. The arch was cast over steel thimbles set in position on collapsible wooden boxes which were placed to line and grade and tacked to the outside forms. The walls were held together by bolts running through the rail openings and holding the line with double 2 x 4 wales. The small crew used for rubbing the concrete surfaces also placed the hand-rail and sidewalk concrete, the only hand operations on the job, and they kept pace with the work at all times. Since the hand-rails were all rubbed with carborundum, and the sidewalks were hand finished, all of the side forms were removed within six hours of pouring to facilitate the finishing.

EXPANSION JOINTS AND REINFORCING

The approach walls were designed as separate units, 39 feet 6 inches long, and the box abutments were each built in three sections. Each section was built as a unit, with keys and metal waterproofing strips for the only connection. Sections were run alternately and the ends of the first sections run were plated with composition asphalt felt to take care of the expansion. The intermediate sections were run against this material. This type of joint has taken care of expansion and there has been no leakage between sections. The same general methods were used in building all the sections. Excavation was brought to approximate grade and the

The North Approach of the Underpass. Note the Old Buildings on Both Sides of the Approach, Full of Machinery and Waiting for the Chance for Damage Suits—Which They Did Not Get.

sectional forms for the footings placed to neat lines and grade, after which the piles were cut off where used, excavation completed and the reinforcing material placed. The steel reinforcing bars were furnished cut, bent and tagged by the company which as subcontractor also set and tied them. The steel was stored in his yard, being delivered on schedule as required. Bracing across the excavated section was used to hold the steel to line and grade. The foundation concrete was then placed, being hauled to the job, as was all the concrete, in 2½-yard transit mixers. The foundation concrete was poured to neat lines and was carefully struck off and smoothed so as to facilitate form setting. Blocks for keyways were set in all foundations after the concrete had partially set.

Pouring Transit-Mixed Concrete

As soon as the forms were removed from the footings, the sectional wall forms were set to approximate position by machine and lined, braced and tied by the carpenter crew. The forms for both the high retaining wall and the low wall carrying the outside of the walk were placed at the same time and braced together. All forms were oiled before being tied with ⅜-inch rods with cones and lock nuts for both tying and spacing the forms. The form work was completed by the day crew in almost all cases and the concrete run by the night crew. The entire job was adequately lighted electrically for this night work. The concrete was hauled in the mixer trucks and delivered for the wall work at a slump not greater than 3 inches. Owing to the use of an admixture, however, and the placing of the concrete by bottom dump 1-yard buckets with controllable outlets and handled by the cranes, no difficulty was experienced in securing a good finish. This was also facilitated by the smooth ply-wood lining of the forms and by the tamping which was done by means of two electric hammers, operated on the studding of the forms at approximately 2 feet above the surface of the concrete in the forms. The concrete was, in this way, kept in constant motion until it was in contact with the forms and there was practically no patching of rough or honeycombed spots on the completed work. It was necessary to design the forms with more studding and waling than would be used where concrete is puddled by hand. When finishing, it was only necessary to rub enough to remove grain marks left by the ply-wood lining and to whiten the work. No form marks or fins were rubbed as the lining was carefully butt joined and firmly nailed at all edges.

The box abutment sections were built in much the same manner. Owing to the fact that the concrete trucks and machines could operate clear throughout the work and could enter and leave from either end, or from both ends, unusual speed was shown on this portion of the work. Since all of the foundation concrete was chuted to place, as many as four trucks were dumped at one time, 10 yards of concrete being placed in two minutes on several occasions. In building the walls for the box abutments and in running the I-beam deck slab under the tracks, two machines, each handling 1-yard dump buckets, placed the concrete quickly and well.

When the tunnel section was completed, the machines moved away from the center of the work, breaking the pavement with skull crushers made of old drop hammers, the property of the contractor, and loading trucks on the pavement behind them with dragline buckets. Thus, all hauling operations for the entire structure were handled on the pavement at street grade.

Work was begun on the diversion of sewer, water and telephone lines on June 19, 1931, and was continued most of the time in two 10-hour shifts until the completion of the structure, except paving, on December 24, 1931. The pavement, a 7-inch reinforced concrete slab in open sections and 9-inch through the tunnel, was placed in January, between heavy rains. Because of the weather nearly all of the concrete was delivered by the transit mixers and buckets as the grade was too soft for trucks loaded with 10,000 pounds of concrete to operate. Drainage was handled by the city storm sewer system through vitrified pipe sewers built on a creosoted pile trestle with submerged foundations to a sump, built as an open caisson to bed rock and containing duplicate 1,200-gallon vertical centrifugal pumps, automatically started by floats and discharging through a 12-inch cast iron line to the main sewer at the north end of the structure.

Personnel

These subways, which had many unusual features, were designed by the engineering staff of the Rock Island Lines, W. H. Peterson, Chief Engineer, with the design and construction being directed by I. L. Simmons, Bridge Engineer with H. Bober as Resident Engineer. The cost of the work was divided between the two railways interested. John W. Fox, a veteran Rock Island contractor, was awarded the work and was constantly on the job. For the contractor Henry C. Coates was General Manager and the author, Chief Engineer and General Superintendent.

A Study of the Effect of Hot Cement in Road Paving

EARLY in September, 1931, observations were made and data secured by P. D. Miesenhelder Assistant Chief Engineer in charge of materials and tests for the Indiana State Highway Commission, during the construction of comparable sections of concrete pavements in which hot and cold cement were used. Practically no adverse effects upon workability, strength, volume change, or checking and cracking, traceable to the use of cement at approximately 160 degrees Fahrenheit, were noted on these sections of pavement.

With the exception of the cement temperatures, the concretes in the different sections were as nearly identical as possible. The aggregates used were washed sand and crushed limestone mixed in the proportion of 7 sacks of cement to 1,284 pounds of fine aggregates, 2,107 pounds of coarse aggregate and approximately 30 gallons of water. No rapid setting occurred. No consistent relation between cement temperature and slump of concrete was observed. Some differences in workability, in such factors as ease in spreading, rate of set and stickiness during finishing, were reported by the workmen but it would seem that weather conditions rather than the temperature of the cement was responsible for these. Data available at the age of 34 days showed no distinction between volume changes in the sections of cold and hot cement, and a crack survey indicated no distinction between cold and hot cement.

From Highway Research Abstracts, issued by the Highway Research Board.

State Paving Financed by County Funds

Cobb Bros. Construction Co. of Meridian, Miss. Completed Short Section of Concrete on U. S. Route 80 Toward Alabama Line

MISSISSIPPI is unfortunately heralded by all of its sister states and by gas stations within its borders as the state where you must hoodwink your headlights and insure your windshield so that you may come through the year without a hole in your pocket to pay for the holes in your glass. It is true that Mississippi has too large a proportion of gravel roads, but she builds paved roads, when she does build them, that are comparable to the best of any state that builds them all the time. Just at present the state is handling the construction of its roads with Emergency and regular Federal Aid funds, and in one or two cases by permitting the county to finance a program and then refunding the money to the county when the present bond issue for road construction is sold. Lauderdale County, at about the mid point of the eastern border of the state on the Alabama line, is in a position to finance road work at this time so that a rather long piece of concrete work was under way there during the summer of 1932, as well as a long grading job which involved the widening of a number of old bridges. The present article is confined to the work of one of the contractors on the concrete paving.

Contractor Tackles His First Bulk Cement Job

Cobb Bros. Construction Co. of Meridian, Miss., the contractor for a 2.064-mile section of this 9-6-9-inch pavement, lined up with the growing army of contractors who are using bulk cement for their road work. The sand and gravel for the work was received at Russell, Miss., in gondola cars from the American Sand & Gravel Co. of Hattiesburg, Miss. They were unloaded with a P & H 206 crane with a 42-foot boom and a ¾-yard Owen bucket. Fair-sized stockpiles were maintained but the major portion of the aggregates was unloaded direct to the Blaw-Knox 2-compartment batching plant. A 7-bag batch was used with a 1.60 cement factor determining the mix.

The batch trucks were all one-batch units of which the contractor owned six and local men owned a maximum of twenty trucks. These men were paid by the batch, no matter how far the batch was hauled. The contractor used his own trucks to make up the deficiency when the haul was long and then as the haul was shorter and the profit to the local owners greater, he dropped off his own trucks and rotated the others so that all had an equal chance to profit by the work. The maximum haul on the job was 3 miles, of which 1 mile was dead haul. All the trucks were equipped with dual pneumatic tires and were either gravity or hydraulic dump. Each truck carried a cement box which was mounted two-thirds of the way back from the front on the hydraulic dump bodies and one-half way back on the gravity dump trucks. The boxes were hinged at the lower front corners and latched in an upright position with a hook which was tripped just before dumping the batch. The containers had metal covers hinged to the box but rough usage sometimes made them anything but watertight, or rather cement tight, and it was necessary constantly to use sledge hammers to keep the covers sufficiently tight to prevent spillage on rough

going or in turning corners. The bottom of the boxes set at the level of the top of the body in a metal frame built for this purpose.

The labor required at the batching plant included a crane man, two men in the cars and the batch man. The trucks backed under the batching plant at all times.

The cement was received from the Marquette Cement Co. at Memphis, Tenn., in bulk in box cars. The cars were spotted at a cement runway about 60 feet long which permitted delivery from two cars without shifting the cars. Four men in the car shoveled to the four KoneKarts which were run in one on either side of the door. Two men wheeled the carts from the car to the weighing platform which was a bit inconveniently placed at the extreme end of the platform, requiring a double movement of the carts from the car to the platform and back to the dumping dock. The cement was checked by the state inspector and the weight made up by the wheeler and then the cart was rolled to the dumping dock.

The dumping dock was built out over the depressed run for the trucks and was at the level of the cement car door so that there was no pushing of the rubber-wheeled cement carts up hill. The dumping opening was protected on three sides by 2 x 4's so that the cone-shaped bottom of the cart would be centered over the opening without any need of shifting the cart. Beneath the opening there was a burlap chute to prevent the cement flying when dumped and a man below spotted the trucks and gave the signal for the wheeler to trip the latch on the bottom of the cart with his foot. There was very little flying cement when the cart was dumped. To dump the cement quickly and cleanly the carts were equipped with a crank at the top which turned a screw inside the carts to break down any arching of the cement. The man below released the trucks as soon as the cement was dumped and, as they pulled out, turned over the cover and checked the latching of the container.

Fine Grading and Form Setting

Mississippi is another of the group of states that we have congratulated many times for the manner in which they handle the rough grading on new state highway work. The rough grade was completed under a separate contract a year previous to the paving of the road. Thus Mother Nature, and perhaps a considerable volume of traffic over the road which was maintained as a top-soil road, compacted the grade as few pieces of equipment can do. This left a fine foundation for the slab the next year. The rough grade was quite uniformly 2 inches higher than the final grade of the subgrade.

Ahead of the form setting, the fine grade was cut with a Caterpillar Thirty pulling an 8-foot blade grader. This same unit cut the trench for the forms and the thickened-edge trench for a distance of 3 feet from the form line. The second tractor, a Caterpillar Twenty, handled a 1-yard Western fresno and pulled the Lakewood scarifier. The larger tractor was used to pull the Lakewood subgrader after the forms were set.

The Heltzel 9-inch steel forms with a 6-inch base were set quickly by a well-organized crew consisting of one line setter, three men cutting the trench by hand on either side, a form setter and a helper who set the forms on both sides, driving but one pin at the lead end of the form. He was followed by two other form men who drove the other pin and drove in the locks. As soon as possible after the forms were set the Lakewood subgrader was pulled over the line, cutting the grade to ¼-inch high and leaving the dirt in windrows for six laborers to shovel out by hand. After this one man and two helpers realigned the forms and tamped under the base as necessary.

Plenty of Work for Everyone in Concrete Crew

The one-batch trucks turned through a space in the forms ahead of the paver and backed into position for dumping. When the opportunity permitted, the driver unlatched the cement container and lifted back the cover so that it would be ready to tip over automatically when the truck was dumped.

The 27-E Smith paver powered with a 6-cylinder Waukesha engine carried a Lakewood push plane set ⅛-inch higher than the finished grade, and a Carr trail-grader set to cut to the true subgrade. Two men in front of the push plane shoveled out the dirt that accumulated and also dumped the batch trucks. Ahead of the paver one man oiled the forms and also placed the ¾-inch by 29-foot 6-inch longitudinal rods, one on either side of the slab and against the forms. Two men handled the dirt from the trail-grader. Two others pushed the all-metal scratch template, with teeth set every 6 inches to true subgrade, every time the paver moved ahead. These same two men cleaned out against the forms and set the chairs for the longitudinal rods 3 inches from the top of the slab and 6 inches from the forms. The trail-grader man and the scratch template man on each side carried in the 49-pound wire mesh on either side and placed it before the concrete was spread. One man set the Kalman center steel in 10-foot strips, 5½ inches high. A pipe gage with an angle iron on the form end was used to set the center steel accurately. Deformed rods 4 feet long and ½-inch diameter were set through the center steel at 5-foot intervals to tie the slab together.

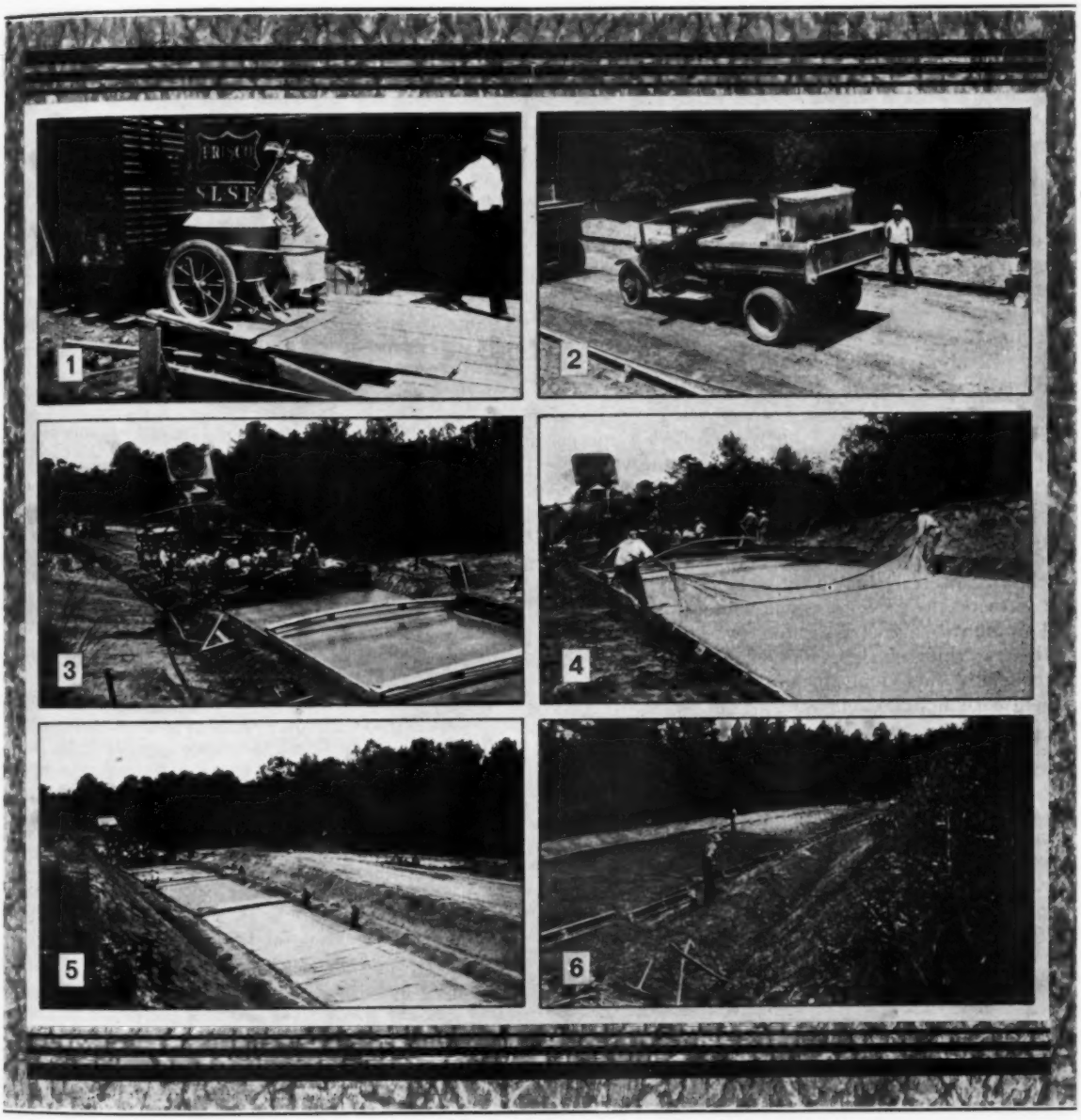
The concrete placing was handled with regularity first on one side and then on the other so that the rods through the center steel and the metal center strip would not be displaced.

Expansion Joints

The expansion joints were formed with ¾-inch Elastite material in two pieces running the full depth of the pavement every 60 feet. The two pieces of expansion material were set as one piece with a cap which ran the full width of the pavement, leaving the Elastite ½-inch below the top when the cap was removed later. The expansion joint was pinned in place with two ½-inch pins 18 inches long on either side to hold it while the concrete was being poured. These were driven to the level of the cap so that the finishing machine could be run across the joint.

One man was delegated to handle the making up and placing of all the expansion joints. He staked them in place and ran through the 10 dowels ¾ inches by 4 feet spaced every 2 feet across the joint in slots left

for that purpose. Chairs were put under the dowels on the paver side of the joint and metal sleeves on the dowels on the side away from the paver. These sleeves were notched or pinched about 2 inches from the end so that the dowel could not readily push through to the end in placing them. This left room for the expansion



THE COBB BROS. JOB FROM CEMENT DOCK TO CURED PAVEMENT

1. Weighing the cement batch on the bulk cement dock. 2. One of the cement containers mounted on a hydraulic dump truck. 3. A general view of the paving and finishing operations. 4. Pulling wet burlap over the slab to obliterate marks caused by finishing the edges of the expansion joint. 5. Hand-finishing the slab. Also showing two men laying burlap along the edges and one of the teams bringing up forms. 6. Placing and sprinkling earth for curing.

of the dowel after the paving was completed. The sleeves ran full length of the dowels on the one side of the joint.

THE FINISHING CREW

There were five cutters or puddlers for the concrete as placed by the mixer. Two of them spaded the concrete against the forms as the finishing machine backed away after its first pass over the concrete. A Lakewood 2-screed finishing machine was used with one operator. The paver operator had a helper who came on at the end of the day and assisted the operator in cleaning and greasing the machine. This job was operated with a 1-minute mix for the concrete.

A dummy joint cutter consisting of two 2½ x 2½-inch angle irons riveted back to back was carried on the back of the finishing machine for cutting the joints every 60 feet or mid-way between the expansion joints. This was used by two of the puddlers to cut the joint. It was pressed or pounded into the concrete at a point

indicated by a stake on either side at the forms. They immediately removed the cutter, leaving the stakes in place so that the finishers would know the location of the slot after the finishing had been completed over it.

Behind the dummy joint cutting came a double roller bridge with a 14-foot longitudinal float operated by two men who also used the drag straight-edge. Two joint men ran the 8-inch canvas belt which was held taut by a bowed wood top. Then they pulled a piece of wet burlap over the slab to obliterate all traces of the finishing of the edges of the expansion joints. These men cut the dummy joints and pulled the caps of the expansion joints and edged the joints and the sides of the slab. A special hand tool had been developed by the contractor for edging the dummy joints which, it will be recalled, were merely cut in the slab and nothing left to hold the material aside. The tool consisted of two pieces of sheet metal bent so as to form a vertical leg 2½ inches long and a horizontal leg 2 inches long with a ⅜-inch radius to the bend. These two plates placed back to back opened the dummy joint slot to a depth of 2½ inches and ¼-inch wide and finished the top 2 inches on either side of the joint. The joint cutters worked from a 4-wheel bridge equipped with old hand-car wheels. They also used a special hand edger with a 5-foot handle, making the work of edging much easier as they could stand up in performing that operation while most of their work was done bent over double. The edges had a point that went down ¾ inch against the form and a broad flat part 4 inches wide that rested on the slab. It had a ¾-inch fillet to round the edge. A 6-inch whitewash brush was used to smooth over the sections where the finishers had been working on the edging of the joints and sides of the slab. The joint men also carried a 10-foot straight-edge for checking the line of the slab across the joints to be sure that the pavement would ride smoothly at that point.

The Curing Crew

An open wheel burlap bridge was used by two men to handle the 10 x 22-foot strips of burlap which were placed on the concrete as soon as possible after the joint men had completed their work. The burlap was folded into thirds before being placed on the bridge and was wet down so that damp burlap was spread. The burlap was wet down after placing and was kept wet on the pavement until 10 A.M. the next day when it was removed. One man was used to keep the burlap wet.

A homemade tar barrel heater heated the asphalt for the dummy joints and for filling the upper ½-inch of the expansion joints. One man poured all the joints as soon as two men had removed the burlap which was folded carefully and laid aside to be hauled ahead by the same team that carried the forms forward. Before the curing started, one man who had no other duties straight-edged the pavement with a 10-foot wooden straight-edge to finally check it for high spots. If any were found they were immediately rubbed down with a frame holding two carborundum blocks. The pavement was then checked and rechecked until the high spots were entirely removed.

The earth cover crew removed the forms and piled them for the team and wagon to haul them forward. When inquiry was made about the team, the contractor stated that a team of one horse and one mule was used, a fact which was duly recorded. A few moments later the wagon came up with two horses pulling it. The contractor was surprised and it was suggested that perhaps a little gentle pulling of the ears would make the team accurate as far as the record was concerned. Only a few minutes later the team came up, and behold it was a team of two mules and not two horses. The explanation was that usually there was a mixed team but that particular day there happened to be two teams working, each paired properly.

The curing crew consisted of ten men who shoveled the earth onto the slab. One man was used for each 1,000 feet of cover to sprinkle the dirt. The cover was sprinkled for 10 days and then the earth removed to the shoulder with a light grader and the Caterpillar Twenty. When the cover crew pulled the forms they opened each expansion joint the full depth of the slab, picking out any concrete that might have run in between the form and the end of the expansion material.

The Shoulder Crew and the Water Supply

A grader and tractor from the fine grading operation was used after the completion of the paving to shape up the shoulders. The specifications required a 5-foot shoulder on fills and a 4-foot shoulder in cuts. Water for all the operations on the job was provided by a Barnes triplex pump driven by a 4-cylinder 40-horsepower Hercules motor. A 2-inch pipe was used the entire length of the job with taps for the paver hose and the sprinkling hose at intervals of 240 feet. The paver carried 150 feet of 1½-inch heavy-duty rubber hose and ¾-inch hose was used for the sprinkling.

During a particularly hot spell last year the contractor found it necessary to run the pump an extra shift as the earth cover dried out very quickly. He was about to make arrangement to get a second man when the regular pump man asked if he might have the job and make a little extra money as he was a little hard up with illness in his family. The contractor agreed but told him he must watch the pump carefully and not let it stop without orders. On one occasion the contractor had enough water and was close by so went up to tell the pump man to shut off the water. He found him sound asleep and the pump running perfectly. Without a bit of noise he slipped up and shut off the switch; hardly had the pump stopped when the pump man was on his feet looking at it to find out what was the matter.

The contractor ran his paving outfit 10 hours a day in winter and 12 hours a day when the light would permit. This job was run 12 hours and an average of 1,000 feet of slab laid each day. The total bid for the work was $33,771.52 for 23,371.3 square yards of 9-6-9-inch concrete pavement.

Personnel

This 2.064-mile contract was awarded to Cobb Bros. Construction Co. of Meridian, Miss., at the price above. For the contractor Everett J. Cobb, Vice President acted as Superintendent in the field. M. G. Cobb is President and H. E. Damon, Secretary, of the Corporation. For the Mississippi State Highway Department, J. B. Craig was Resident Engineer.

Cast Iron Pipe

Laid Over Western Hills Viaduct in Cincinnati, Ohio

By

W. V. Bickelhaupt

Bickelhaupt, Inc., Contractors, Richmond, Va.

THE major portion of the city of Cincinnati, Ohio, is separated from the Western Hills section by Mill Creek. Connecting links between the city and the suburban sections included several grade crossings over the railroad tracks and small street bridges over Mill Creek. As a part of the new Union Terminal development, these grade crossings and street bridges were abandoned and the Western Hills viaduct built to replace them. The various water mains which crossed these small bridges were also abandoned and a new 36-inch trunk main was constructed on the viaduct to replace the numerous smaller mains.

The contract for the pipe line work included connecting with the existing 30-inch cast iron main at the intersection of Queen City Avenue and the Baltimore and Ohio tracks on the Beeckman Street side, and from there running the new 36-inch cast iron main south for a distance of about 800 feet to the west end of the Western Hills viaduct. This portion of the pipe was supported on a concrete trestle which in turn was supported by creosoted wood piling. At the west end of the viaduct the pipe was taken vertically, for a distance of 40 feet to the lower level of the viaduct, through a shaft opening in Pier 50 of the viaduct which was planned and constructed for this purpose. The 36-inch pipe was then taken across the viaduct a distance of about 1,500 feet to the east end of the viaduct where it was taken down vertically a distance of 30 feet to connect to an existing main. The pipe is carried across the viaduct in a concrete trough built into the viaduct for that purpose.

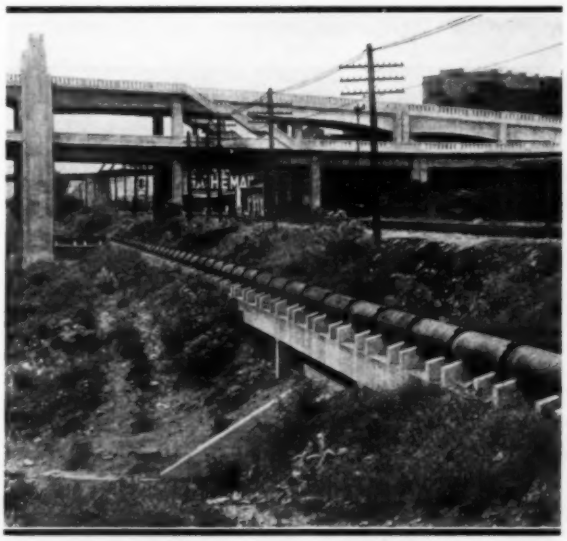
Before any of the pipe was ordered, an accurate survey of the line was made in the field and all dimensions were carefully checked. The entire line was then detailed and the pipe ordered. All pipe was unloaded direct from cars to trucks at the railroad yard by means of a standard stationary railroad unloading crane. Each 12-foot length of pipe weighed about 3 tons.

The cast iron pipe for the straight run was Class C pipe with milled shoulders for Victaulic joints and was furnished by the Lynchburg Foundry Co. in 12-foot lengths. The cast iron pipe for the vertical risers was Class C B & S with lugs and bolts at the joints. The Victaulic joints for this project were furnished by The Case Hardening Service Co., Cleveland, Ohio.

The fact that the pipe line over the viaduct was laid to both a vertical and a horizontal curve together with the sharp bends and vertical runs at the ends of the viaduct introduced many unusual construction problems.

The Concrete Trestle

The concrete trestle which supports the pipe from Queen City Avenue to the west end of the viaduct rests on 50-foot creosoted piling. At the time this work was done, the bank of Mill Creek sloped from the edge of the Baltimore and Ohio right-of-way at an angle of about 45 degrees and a large outfall sewer crossed the line at a point about 200 feet from Queen City Avenue. A Bucyrus-Erie crane equipped with a 65-foot boom



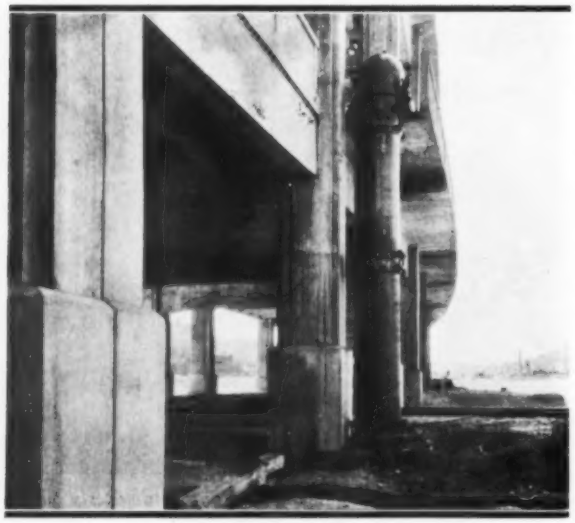
The 36-Inch Main on a Concrete Trestle Rests on 50-Foot Creosoted Piling

The Pipe in the Concrete Trough Built into the Western Hills Viaduct for That Purpose

and a 3,500-pound drop hammer was used for the pile driving. Work was started at the Queen City Avenue end of the line and the crane dug its own road as it proceeded below the line of the new pipe. In other words, the piling was driven on the up-hill side of the crane. It was first planned to bridge the sewer outlet but, owing to high water at the time it was necessary to cross the sewer, this plan was abandoned and the crane was taken along the Baltimore & Ohio tracks and worked down the slope across the sewer by the contractor's traditional expedient of "the grace of God and a high wind." Owing to the cramped quarters, and the proximity of a pole line carrying cables and telegraph wires, extreme care was necessary at all stages of the pile driving operation. After pile driving had been completed, the crane was taken out to Queen City Avenue over a bridge thrown across the sewer outlet.

PLACING PIPE ON THE VIADUCT

All pipe on the viaduct was placed from the lower deck of the viaduct. A small General crane with an 18-foot boom was moved along the outside of the lower viaduct deck on the side on which the pipe trough was located. Each truck backed up to this crane and the pipe was swung over into the trough and set on wood blocks. The pipe was lined up for joining by means of a small double A-frame derrick which straddled the pipe and was equipped with a chain hoist. About 200 linear feet of pipe was laid per day by this method and both street car and vehicular traffic was maintained on the lower deck of the viaduct at all times.



The Riser at Pier No. 25 Looking West

The vertical pipe in the pylon shaft at the west end of the viaduct was set from the top by means of a winch truck. The vertical run of pipe at the Spring Grove Avenue end of the viaduct was erected with a crane working from the ground level. The pipe on the concrete trestle was placed from trucks by means of a crane and lined up and connected by means of the same light traveller used on the viaduct.

After the new line was cut into the city system and the pressure turned on, all wood blocks were removed from under the pipe and replaced by concrete saddles.

PERSONNEL

This contract was constructed by Bickelhaupt, Inc., Richmond, Va., for the Cincinnati Union Terminal Co. who turned the completed project over to the Water Department of the city of Cincinnati. The project was in charge of R. L. Blackburn, Superintendent for the contractor under the direction of George P. Stowitts, Engineer of Construction and George H. Wells, District Engineer for the Cincinnati Union Terminal Co. and A. S. Hibbs, Superintendent, Department of Water Works, Cincinnati, Ohio.

Modern Equipment and Skilled Labor Hasten Completion of Dirigible Base

ON October 15, 1928, a small group of civic-minded citizens in the San Francisco Bay area began working to obtain the site of a dirigible base as a gift to the Navy Department. On August 1, 1931 the deeds for the property were handed over to the government and on October 2, 1931, contracts were let for building the airship dock.

The site of the Sunnyvale Base comprises 1,750 acres, most of it farm lands and tide flats at the southern end of San Francisco Bay. The site was clear of all obstructive growth and is in the shape of a bowl. The only work necessary to prepare the site for use was leveling, building roads and digging structural foundations. The work however started with the rainy season and proved to be a battle of mud from the outset. The leveling of the site provided an ideal set-up for the tractor-scraper method of excavation and Caterpillar tractors with 6 and 7-yard Ateco hydraulic scrapers were used. Actual excavation for the foundation piers was done by hand, but the whole floor of the huge hangar was leveled and cuts to a depth of 6 feet were made by the tractors and scrapers.

The work is being done under two separate contracts, totaling nearly $2,000,000. One covered the erection of the hangar; the other, the grading, concrete piling and foundations, tracks for the rolling doors and a railroad spur. The grading and leveling are now completed, the railroad spur is finished and is handling heavy loads of structural steel for the hangar and the roads have been constructed by tractors and graders. A Caterpillar Auto Patrol, owned by the District of Public Works, is used to maintain the roads.

The Sunnyvale Base is one of three Army and Navy Air Bases which are being built on the Pacific Coast and which are supplying work for a number of contractors and providing jobs for several thousand men.

Winter Construction

Part V—Protection of Concrete

A Symposium Covering Expense, Excavation and Grading, Steel Construction, Handling and Heating of Aggregate and Protection of Concrete

THE article on Winter Construction in the January issue of CONTRACTORS AND ENGINEERS MONTHLY discussed the various methods of handling and heating aggregates and protecting concrete during severe winter weather. This article, which completes the discussion of this phase of winter work as well as being the last of the series, is devoted to a brief description of jobs on which contractors have met the problem of protecting concrete during cold weather. This material was secured from actual reports from the contractors.

A FEW TYPICAL PROJECTS

A Colorado contractor built a bridge 301 feet long by 40 feet wide with a floor system of steel I-beams and a 280-foot roadway and two 5-foot sidewalks. The concreting required 40 men to place the 800 cubic yards of concrete. Water was obtained from the river below and pumped to a heating tank where it was raised to 80 degrees Fahrenheit by means of live steam with the boiler pressure at 125 to 150 pounds. Another pump conveyed the heated water to the Koehring mixer where it was combined with the dried sand and stone with 10 per cent additional cement to facilitate setting. Two minutes instead of the usual one and a half were allowed for mixing and the forms were heated 24 hours prior to the pouring of the concrete. Coke-burning salamanders giving a slow steady heat were used and special attention was given to them from 4 o'clock in the afternoon until well along in the morning. When pouring was completed for any one unit, that portion was promptly housed in heavy canvas and provided with heat. The temperature of each enclosure was kept at about 60 degrees with six stoves to each enclosure under the bridge and between the spans. "With an outside temperature of 20 degrees Fahrenheit and over, there is no difficulty in maintaining the concrete at 60 to 68 degrees Fahrenheit when placed," stated the contractor.

The Western Foundation Co., Chicago, Ill., who casts concrete piles in place, heats the aggregate and water and delivers the mixed concrete to the forms by buggies. The mixer is not heated, but the concrete is at a high temperature when poured and is protected by wrapping the forms with straw held in place with burlap.

A Minnesota contractor has had some interesting experiences on bridge and retaining wall work in winter where the concrete footings were below the water line. These were placed in the dry and then flooded, the water being kept at 60 degrees Fahrenheit by steam pipes. All other concrete was housed with structures covered with waterproof paper or canvas with ample room for the removal of the forms and the space kept warm by steam pipes. All pipe joints were made loosely to allow the steam to escape and keep the air moist. The forms were removed in 24 to 48 hours and the exposed surfaces rubbed with carborundum brick to finish. The heat was maintained at 70 degrees for seven days, and 60 degrees for seven more days. Three days were allowed for cooling before removing the housings. On one of the retaining wall jobs the water for mixing was heated by passing it continuously through the water jackets of the 20-horsepower mixer motor.

A St. Paul, Minn., building contractor reports his protection method on a bank building of 28 stories as follows:

"Thorough-going preparations were made in advance for protection during the rigorous Minnesota winter since the bulk of the construction operation was placed for winter work. At all times five floors were enclosed in canvas hung from beams above to the floors below and fastened only at the top and to the columns. To reinforce the canvas so as to enable it to withstand wind pressure and to prevent bellying, a 1½-inch rope was sewed horizontally to the canvas in the middle of each strip. This rope was clipped to the columns and

as a result there were only two canvases on the entire job which were torn to pieces by the wind.

"With five floors enclosed, one canvas was always up ahead of the concrete pour so that the floor on which pouring was done was completely enclosed. This served the double purpose of keeping the cold and wind from the concrete and workmen and prevented the latter from seeing down into the street below and developing fear about getting near the outside of the floor.

"Salamanders fired with coke were used to maintain the temperature at 80 degrees, three floors being fired for a period of five days, after which the forms were stripped on the lower floor of the three. In this way one floor of canvas was in process of being shifted from lower to upper levels continuously."

A Nebraska contractor working on an overhead bridge over a railroad crossing with a 7-inch floor 135 feet long made no attempt to cover or protect the underside of the floor as it was practically impossible in any case. Results showed that it was not necessary as the concrete took a good set, showed no checks of any kind, and seemed satisfactory in every way. The aggregates were handled to the mixer in wheelbarrows and to the bridge floor in concrete carts. The mixer was heated by a flame within and by warming the gravel pile by using a culvert pipe with a fire inside. After placing, the concrete was protected by 8 inches of straw and over this a burlap road cover. The concrete was placed at a temperature of about 65 degrees with the outside temperature from 25 to 30 degrees. The temperature of the concrete under the cover 30 hours after placing was about 50 degrees. Three per cent of calcium chloride in solution was used as an accelerator and the concrete was mixed with eight sacks of cement per cubic yard.

A Seattle, Wash., contractor reports that there is seldom severe cold weather in the Pacific northwest so that they never plan on much protection except for possible frost which is taken care of from day to day. If a continued cold spell does come the usual practice is to shut down the job completely and use salamanders for a short period until the concrete has cured enough, after which the job is shut down completely until the cold spell has passed. This contractor uses pre-mixed concrete delivered to the job and handles it the same as for summer work without heating. The usual protection is the placing of Sisalkraft paper over the slab both as a protection for possible frost and for curing, without the use of salamanders.

A Utah contractor working on a dam in Nevada gives us the following outline of his methods:

"We operated our own screening and washing plant located on the shore of Walker Lake about 5 miles distance from the location of the dam. The water was pumped from the lake for the purpose of washing the aggregate. Although we operated in sub-freezing weather, we experienced no difficulties from frost as the aggregates were hauled away almost as rapidly as they were made available and all pipe lines and other parts of the plant were thoroughly drained each evening.

"Sand and gravel were delivered to our mixing plant by the use of dump trucks, which delivered their loads into a hopper and the material elevated to plant bins by a bucket elevator. Placed within these bins were pipe coils, heated by an oil burning boiler. Mounted within these bins, and near the top elevation, was a large metal water tank, which we heated by means of a steam line using live steam for this purpose. We found that we had no difficulty in keeping the water near the boiling point. The aggregates were carried by means of chutes into a weighing hopper and were dumped from the batcher directly into the mixers, by means of short chutes. The concrete was then dumped into a skip, elevated in a tower and chuted to its place upon the dam.

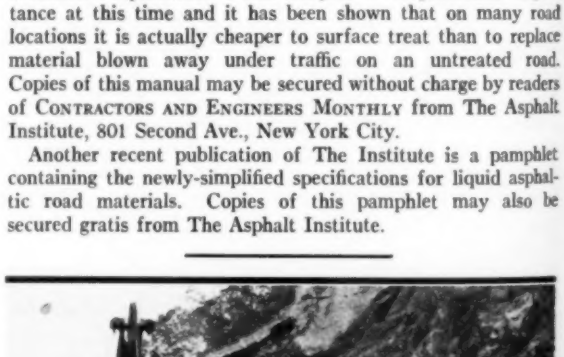
"The plant, including the boiler, bins, mixers and weighing batcher, was entirely enclosed and afforded a very comfortable place for the workmen. After the concrete was deposited, it was covered with canvas, and kept warm by means of live steam which was carried through steam hose and allowed to escape under the canvases.

"We had no difficulty in keeping the mixed concrete at a temperature of about 60 degrees above zero, and keeping it at this temperature until it was sufficiently cured. As the concrete was warm when it entered the chutes for depositing, we experienced no difficulty from frost in the chutes which, of course, are metal. We started pouring concrete just before Christmas and finished in March. Owing to the location of the dam and the season of the year, the sun never reached the scene of operations."

A New Manual on Surface Treatment Types

IN accordance with its plan to put out a complete series of concise manuals on asphalt road construction, The Asphalt Institute has just issued Manual No. 2 on "Surface Treatment Types." This manual, which is the result of a nation-wide study not only of methods but also of places of use, discusses the best practices in meeting every surface treatment requirement. This subject is of particular importance at this time and it has been shown that on many road locations it is actually cheaper to surface treat than to replace material blown away under traffic on an untreated road. Copies of this manual may be secured without charge by readers of CONTRACTORS AND ENGINEERS MONTHLY from The Asphalt Institute, 801 Second Ave., New York City.

Another recent publication of The Institute is a pamphlet containing the newly-simplified specifications for liquid asphaltic road materials. Copies of this pamphlet may also be secured gratis from The Asphalt Institute.



Lima 601 *Shovel, Loading a Euclid Crawler Wagon in a Deep Side Hill Cut*

Walking Draglines

on Levee Enlargement *and* Set-Back

Horton & Price Construction Co. of Lake Providence, La., Used Three Walking Machines and a Crawler on 3,000,000-Yard Job

FOR a time at Lake Providence, La., the question "How does a Monighan walk?" was filled with humor for there were found to be engineers in the levee game who could not accurately describe the process of walking other than to say, with demonstrations with the hands, "it walks like a duck." Paving and general excavating contractors using the usual 1-yard cranes and shovels with crawlers cannot imagine the sensation of seeing one of the big walking draglines lift its 30-foot diameter pan by carrying most of its weight on the two shoes and then, with what at first strikes one as an ungainly lurch, sliding the entire machine forward, setting it down and then with the next revolution of the cams up goes the machine again for another tip and forward motion. Roughly, and in non-technical language, that is the way the Bucyrus-Monighan walks; not like a duck with first one foot forward and then the other.

Horton & Price Construction Co. operated a 175-foot boom Bucyrus-Monighan machine with a 7-yard Bucyrus-Monighan bucket, another 2-yard machine of the same type with a 70-foot boom, a third with a 150-foot boom and a 6-yard bucket, and for dressing backslope a Koehring 1-yard dragline that looked like a toy beside the big 175-foot boom machine near which it was working. For power the 175-foot machine had one 360-horsepower Fairbanks-Morse diesel engine, the 70-foot machine, a 120-horsepower Fairbanks-Morse diesel, the 150-foot machine, a 240-horsepower Fairbanks-Morse diesel and the Koehring, an 80-horsepower Waukesha motor.

For pay load counterweight the 175-foot machine had two 950-gallon fuel oil tanks slung at the rear of the machine. This made it unnecessary to refuel the machine as frequently and also provided additional storage when bad weather made it impossible for a large tank wagon to get anywhere near the machine.

The job on which this contractor was working with this group of machines consisted of about 7.25 miles of levee enlargement and set-back, involving the handling of about 3,000,000 cubic yards of earth. The big machine could handle dirt a maximum distance of about 300 feet and place it accurately in the levee section as

indicated by the spotter. One piece of work that was "pay dirt" included the tearing down of the old levee from the crown for filling the crotch or notch of the old banquette. This amounted to about 400 yards of material moved for each 100-foot station. This work and the dressing of the backslope was done by the Koehring 1-yard dragline. Additional slope dressing out of the reach of the Koehring was done by a 2-up mule team and fresno. The total operating crew for the big machine consisted of three men: an operator, a greaser, and an engineer. There was one white spotter and four finishers. It is interesting to note that a white spotter was used, as it is a tradition, or shall we say a habit, in the levee fraternity, to use only negro spotters for the buckets. A big breaking plow with a 3-up mule team was used for cutting the ground before new dirt was placed either on old levee or in building new.

On this type of work with dragline placement of the dirt, the federal engineers allow for 25 per cent shrinkage, which means that the contractor must place just that much more material in the levee section. On tractor and crawler wagon work the shrinkage allowed is only 15 per cent because of the packing actions of the crawlers.

Horton & Price worked three 8-hour shifts and placed, with the four machines working, about 10,000 cubic yards of material or in the neighborhood of 300,000 cubic yards per month. This is small yardage for the group of machines but the time lost in moving the machines so frequently because of the small amount of material moved per 100-foot station accounts for the small yardage. The enlargement called for between 5,000 and 6,000 cubic yards moved per station.

PERSONNEL

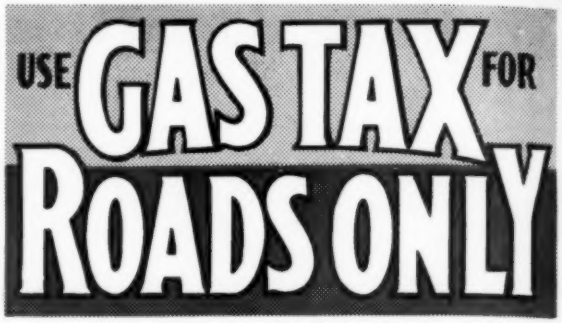
This 3,000,000-yard item was bid in by the Horton & Price Construction Co. at 15.3 cents per cubic yard. The partners in the organization are G. L. Horton and L. A. Price. For the duration of this contract the company maintained offices at Lake Providence, La.

Use Gas Tax for Roads Only

PRINTED appropriately in patriotic colors and carrying the timely message, "Use Gas Tax for Roads Only" windshield stickers are beginning to be seen in large numbers on the highways of various states. They are being distributed by the Marion County, Indiana, Motor Club, the Chicago Motor Club, the Illinois Construction Council, and organizations in Rhode Island and other New England states. They were seen everywhere at the Highway and Building Congress in Detroit in January and constitute a very effective means of combating the organized transportation group which is trying to defeat highway construction by systematic diversion from the gasoline highway tax.

The plan to distribute these stickers was undertaken at the urgent request of state and county highway departments and according to the Ohio Good Roads Federation, some twenty-four industries have shown their direct interest. Highway funds, it is pointed out, were intended for the construction, maintenance, and improvement of the country's streets and highways, and provide a solution to the unemployment problem, since 90 cents out of every dollar is eventually returned to labor.

These stickers, one of which is reproduced here in black and white, are 6½ inches wide by 3½ inches high. They are being produced by the Ray Press, 633 Plymouth Court, Chicago, and are offered to organizations interested in distributing them at prices ranging from $2.50 per thousand in 100,000 to 150,000 lots, up to $3.50 per thousand in 10,000 to 50,000 lots.



A Reproduction of the Red, White and Blue Windshield Sticker

On the reverse of the stickers where it can be read by anybody riding in the car, appears the following information. "Motor taxes were created to pay for the roads and streets on which you drive your car—and for that purpose ONLY. Your mileage costs are LESS when you drive on improved highways. THIS PAYS YOUR MOTOR TAX as long as the road money is spent for improving the highways, the main city streets and county roads.

"Now it is proposed to divert this money from job-giving road work to other purposes—to general public expenses which EVERYBODY should help to pay.

"Motor taxes become CLASS taxes when they are used for other than the improvement of the motorists' roadway. Misuse of highway funds will add thousands to the unemployed ranks. YOU will get less benefit for your motor taxes and so will the working man.

"Let your Public Officials know you want ALL of the GAS TAX and LICENSE FEE MONEY spent for improving highways—AND NOTHING ELSE!

"Both The Working Man And The Motorist Will Benefit."

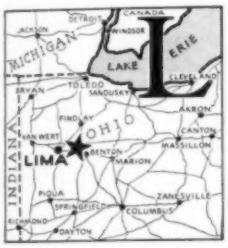
Ready-Mixed Concrete Used on Elevated Highway

THE three miles of concrete pavement over the new Jersey City-Newark elevated highway was laid with ready-mixed concrete transported in eleven Ford trucks equipped with special 1-yard dump bodies. Two mixers were operated, each delivering a 3,700-pound batch every minute and three-quarters. The mixing and hauling were put on a time schedule. As each batch was ready, a bell rang and the truck must be ready to receive its load and haul it a maximum of a mile to the point of laying. This schedule was maintained without appreciable loss of time, in spite of the fact that the trucks had to be operated at relatively high speeds over cat-walks of planks laid on the net work of steel. Fredburn Construction Corp., Staten Island, N. Y., was contractor for this work.

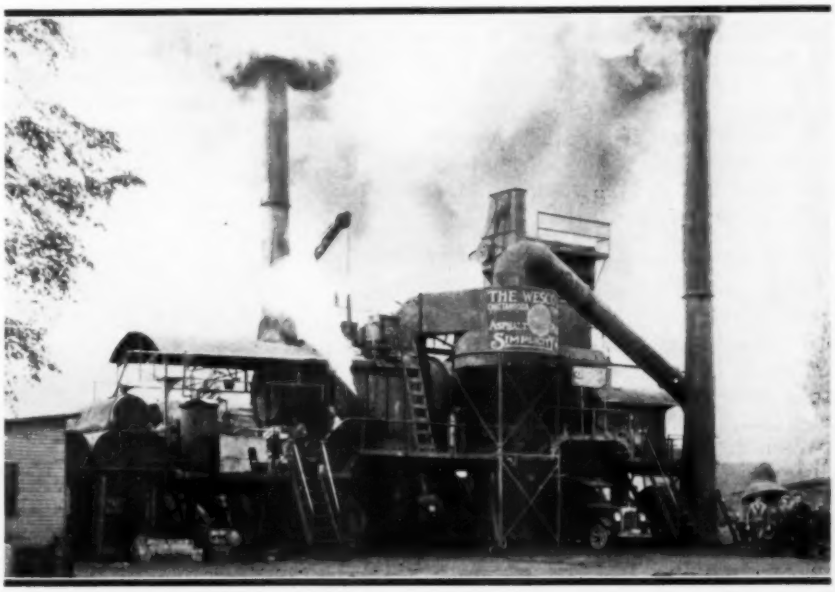
Trucks Delivering Concrete for Paving on the Jersey City-Newark Elevated Highway

Machine Production *and* Laying *on a* 24-Mile Black Top Job *in* Ohio

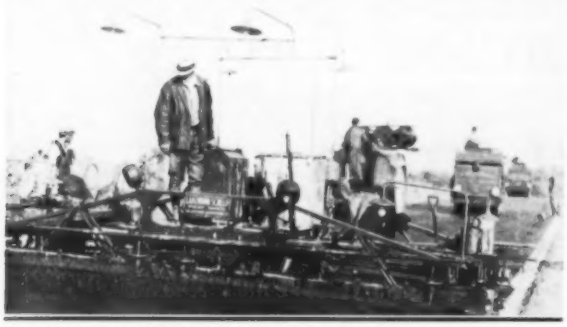
The Wesco Company of Chattanooga, Tenn., Completed Longest Resurfacing Job Let in Ohio in Record Time



LAST summer the State Highway Department of Ohio awarded a contract for 24.75 miles of asphalt resurfacing, requiring approximately 40,000 tons of material, to the Wesco Co. of Chattanooga, Tenn., on U. S. Route 30-S, the Lincoln Highway, east of Lima, Ohio. This resurfacing consisted of a 2-foot concrete widening strip on each side, the outer 9 inches of which carried a header to act as a curb between which was built an asphaltic concrete surface, 18 feet 6 inches wide, of Ohio hot plant-mix specification material T-5. The road was 20 feet overall in width. The construction necessitated the laying of a wedge course to correct the old crown which was excessive, then a base or binder course approximately 1½ inches thick and a 1-inch top course. This entire job was built from a single plant set-up in Lima with a maximum haul of approximately 26 miles for the 5 to 6-ton capacity trucks.



The Compact Asphalt Plant Which Produced 940 Tons of Hot Mix Per Day



The Asphalt Finishing Machine Showing the Arrangement of Lights for Evening Work

The job was started August 25 with the laying of black top and completed on December 1, 1932. Work was carried on in two eight-hour shifts working six days a week, except toward the end of the job when cold weather set in and a seven-day week was necessary. Because of bad weather conditions, snow and rain, four to six weeks of working time was lost. Prior to the middle of November, there was a 9-inch snow fall which materially delayed the work which, according to the original planning, would have been completed before November first.

THE ASPHALT PLANT

The Wesco Co. set up a Simplicity System Model A hot-mix asphalt plant with a 1-ton mixer, having a capacity of 50 to 60 tons per hour, in Lima at the west end of the project. The crushed stone used in the mixture was furnished by the American Stone Corp. of Lima and the sand by the Wapak Sand Co., also of Lima, all deliveries being made by motor trucks to stockpiles. From the stockpiles the aggregates were deposited on the feeder of the cold aggregate elevator by a Bucyrus-Erie power crawler crane. The asphalt cement was furnished by the Standard Oil Co. of Ohio in tank cars. The Simplicity plant operating crew consisted of a plant foreman, one plant engineer and oiler, one fireman, one temperature control man, one asphalt mixer man, one weigh-box mixer man, one plant clerk and checker and one yard handy man. The plant produced 2,250-pound batches, delivering a maximum tonnage of 940 tons in two 8-hour shifts. While working under normal conditions without weather disturbance, the production approached 2 miles of finished road every three days and the maximum individual run was 1 mile of 1-inch top in twelve hours.

HAULING AND PLACING THE HOT MIX

The batches of hot mix were hauled by a subcontractor, R. L. Patterson of Carey, Ohio, who used principally Reo 5-ton trucks, although for the maximum haul several other makes were used temporarily. These trucks were all equipped with dual tires and power dump bodies. The number of trucks varied from five on the minmum haul to twenty-five on the maximum haul.

The trucks dumped their loads into one of two Galion 9-foot spreader boxes and hauled the boxes ahead by chains attached to the trucks, leaving the material spread to the approximate depth ahead of the Lakewood finishing machine. This reduced the hand shoveling crew to the minimum.

The Lakewood asphalt finishing machine was equipped with special inside flanged wheels riding the concrete headers and with a new device known as a "compression strip dolly" which eliminates the necessity of carrying forward the compression strips. This machine spread not only the top and base course but also the wedge course. It was equipped with special high speed gears giving a forward speed of 14 feet per minute which was the maximum allowed on the wedge course and base course and 10 feet per minute on the top. The finishing machine was equipped with a Delco lighting plant rebuilt to suit the particular needs of this job. Large electric bulbs and several headlights were arranged on pipe standards and on the truss frames of the finishing machine, throwing light both forward and to the rear of the machine. These with the lights used on the gasoline rollers provided excellent night working conditions—in fact better from certain standpoints than daylight in that defects in the surface were much more noticeable due to the long shadows. The labor gang for placing the hot mix consisted of four men in front of the finisher operating the spreader boxes and assisting in spreading, the finisher operator, two back rakers and three operators of the 10-ton rollers.

Two important features stand out in connection with the organization and equipment of this job. First, a crew of four men in front and two men behind the finishing machine spread and finished, ready for the rollers, a maximum of 11,500 square yards of top in 12 hours. Second, on the first 8½ miles of the work which had been checked and accepted by the engineers, there were but seven bumps in excess of ¼-inch in 10 feet. A slight increase in such inequalities was met after cold weather set in due to the bad weather conditions. The T-5 specification under which this road was laid is the new type of non-skid hot-mix surface first tried out in Ohio in 1931 and which has proved very satisfactory.

TRIO OF 10-TON ROLLERS COMPACTED THE MIX

There were three asphalt rollers used behind the finishing machine. They were all Buffalo-Springfield gas-operated machines, two being 10-ton tandem rollers and the third a 10-ton, 3-wheel roller. It will be noted in the photograph of the rollers that the 3-wheel machine was equipped with three oil drums mounted immediately over the forward roll. These provided additional water supply for keeping the roller wheels moist while sealing the hot asphalt. This prevented interruptions

(*Continued on page 34*)

Rolling the Hot Mix with One 3-Wheel and Two Tandem Machines

The Editor Comments

Construction Industry Supports 1 in 16 of Nation's Population

An analysis of normal employment in the construction industry based on the latest Census data for the year 1929 shows that an average of 828,772 persons were employed in actual construction during that year. On the basis of two men employed in the preparation of materials and equipment used in construction for each man engaged in actual construction activities, the industry gives direct and indirect employment to more than 2,650,000 workers in normal times. Then estimating at least two non-workers dependent upon each worker, the average number of persons whose welfare rests upon construction activities is as great as 7,950,000 or one out of every sixteen persons in the United States.

These figures are taken from a news release issued by Chas. M. Upham, General Chairman, Committee on Arrangements for the Highway and Building Congress held in Detroit in January, 1933. They furnish perhaps the most dramatic presentation of the importance of the construction industry to the life of the nation, as no other industry contributes as much as construction for protection, comfort, manufacturing and transportation. These figures further increase the importance of consideration of private, industrial and governmental construction. Bankers should ponder on the contribution which it is now possible for them to make to the welfare of the nation by suitable loans for construction purposes in the building of homes, and in the construction of public works. The Reconstruction Finance Corporation is necessarily operating very slowly in the award of loans of self-liquidating projects. The R. F. C. faces a tremendous task, but the work can be greatly speeded if banks will appreciate the opportunity afforded them at this time and increase the volume of private loans on reasonable terms.

Share-the-Work

In an endeavor to provide part time work for willing, waiting, unemployed men, a campaign is under way headed by Walter C. Teagle, President, Standard Oil Company of New Jersey, to encourage American industrial workers to share their jobs with others. In an article in *Review of Reviews and World's Work*, Mr. Teagle says:

"Share-the-work is a measure to relieve unemployment and give the worker that sense of security in his job to which he is entitled. If American business can abolish the worker's fear of loss of a job, it will put wages back into the stream of business and normal buying will gradually be restored. This in turn will make for more employment and greater security for the worker, and greater stability for business.

"Shared-work in a crisis like this is comparable to the practice of civilized peoples in a famine situation. If there is but a limited amount of food, no one would suggest feeding two-thirds of the distressed people fully and letting the other third starve. The available food is rationed. That is what we are now doing with work, because there is a partial famine in work."

We have already recorded in the editorial pages of CONTRACTORS AND ENGINEERS MONTHLY the attitude of a group of Wisconsin highway contractors who, even before the state required that long contracts be broken up, actually shared the work with other contractors so that additional construction outfits would be placed at work. The United States Bureau of Public Roads has already recognized the need for sharing work on highway projects and has required that on Federal Aid emergency construction highway projects, the working hours of labor shall be restricted to 30 per week except for those in a supervisory capacity.

Construction is the key to our prosperity years. If we would smooth out the infamous "business cycles" into a straight line leading upward at a slight grade toward the goal, which may never be obtainable, but which is the ideal of mankind, namely, prosperity for all, the construction industry must unite in an endeavor to spread its activities uniformly through the decades and uniformly throughout each year, thus avoiding periodic years of unemployment and periodic seasons of unemployment. Furthermore, construction must learn to share-the-work and thus give employment to more labor within its ranks during such times as construction activity is reduced in intensity.

Use Gas Tax for Roads Only

Are you doing all you can to promote this essential idea? If the present diversion is not checked and if further diversion occurs, highway construction and maintenance will cease to be major industries.

Theodore Reed Kendall

How the Other Fellow Did It

Ideas That Have Already Proved Helpful to Contractors

This Operator Believes in Signs

204. A hand painted sign, done by one not too well accustomed to the art of fine painting, on a western Iowa paver job carried this message, "I Loan No Tools." The exasperated paver operator had more than once been held up because some handy mechanic on the job had borrowed his pet wrench or drill and it could not be found. Paver shut downs mean not only lack of production but an actual leak in profits because the crew has to be paid if they are out on the grade. On another paver we saw three neatly placed tool chests each with its padlock. The padlock keys were kept on the operator's platform, not in his pockets, because they might be lost when he was off duty. Two of the tool chests carried the paver tools and the third a miscellaneous assortment of odd tools which the superintendent said had proved most effective in overcoming unusual difficulties met in his 20 years' experience with construction machinery. 23.6.48

Temporary Strengthening of a Steel Bridge Structure

205. When a contractor went into a job in western Illinois, he found that the existing bridges which were later to be replaced with larger concrete structures, were not sufficiently strong to carry the weight of his paver and rollers without strengthening. One bridge over a navigable stream was temporarily reinforced by placing a barge lengthwise under the bridge and bracing the structure to the deck of the barge. This was necessary as permanent piling or other structures could not be built in the stream. Another bridge over a stream not classed as a navigable waterway was strengthened by hanging the floor system from piles jetted into a stream bed. Twelve piles, six on a side, were driven from 5 to 8 feet into the bed of the stream by jetting, using the road pump located on the stream bank to provide water for the paver as the source of water for jetting. The piles were held up by a tractor and sheaves and tackle hung from the top trusses of the bridge. Heavy wire cables were passed from the top of the piles in the form of a sling under the ends of the floor beams and added much to the strength of the structure, insuring the safety of the paver in crossing and also of the loaded industrial railway trains which later carried the batched aggregate and cement to the paver. 23.6.62.

Contractor Used Two Iron Hand Screeds

206. An Ontario contractor who was not using a finishing machine on the 20-foot pavement which was being poured, fought shy of the heavy and awkward wooden screeds. He used two screeds made especially of channel iron sections, the first being 6 inches wide and the second 4 inches wide. The second screed was very light but strongly made with long braces from the handles to increase the rigidity of the screed. This screed was especially made to be easily handled and to use continuously, instead of for short stretches as in the case of the first and heavier screed which was more in the nature of a strike-off. The principal of the second screed was that it would be used both forward and back over distances as great as 75 feet without stopping. Thus it would iron out any ridges left by the starting and stopping of the heavy screed. This theory worked out quite well on this job as the pavement that had been opened rode very smoothly. 23.6.58

A Way to Prevent Snow Plows Being Stuck in High Drifts

207. Often a truck with a snow plow will become "skewgeed" between high snow banks when bucking large drifts. Then it is a difficult job to get straightened out in order to back up for another push. If the operators will carry a couple of pieces of bridge plank 3 by 12 inches about 8 feet long and when the truck becomes angled between the banks, place these planks on edge between the snow bank and the bottom of the wedged tires, the wheels will slide along the planks instead of pushing farther into the bank and the truck will straighten out while backing up a few feet. L.L.L.

Keeping the Rags Out of the Batcher

208. Many hopper bottom cars have the trap doors packed with rags to prevent dry sand sifting through in transit. These rags cause all kinds of trouble in the batchers by clogging the gates. One contractor in Minnesota overcame this by building a grizzly of ⅜ x 2-inch strap iron held together by ½-inch rods and with pipe spacers, over both the stone bin and the sand bin. The openings were 5 inches square over the stone bin and 3 inches square over the sand bin. This grizzly kept out most of the rags and sticks which were not picked out by the men in the cars. Both the sand grizzly and the stone grizzly were each built in two parts so that they could be easily picked up by the crane and loaded for moving. 23.5.40

The Stop Watch on the Job

209. All the way from New York to Iowa we have noted contractors with stop watches checking the operations of their batching plants and pavers. One contractor, however, employed a keen young man, whom he called an efficiency man, on the grade at all times. One of his duties was to give each truck driver a batch check as his load was dumped at the paver. He also noted every minute's delay at the paver and the cause, and reported them daily to the superintendent, who studied them to note any repetitions of the same causes and immediately took steps to eliminate them. In this manner the superintendent was free to cover the entire job with the knowledge that any delay at the paver would be studied by a competent man and the causes of trouble determined at once. Thus, the usual menial job of checker became a most important one with the added continuous observations of the trucks, paver and finishing machine. 23.6.50

Gate Valves on the Water Line

210. The arrangement of pumps on a water line for a concrete paving job is important. Some contractors simply put a triplex pump at the source of water and pump through a 2 or 2½-inch line for both mixing water and sprinkling for curing. A Missouri contractor working in Iowa figured closer than this and placed a triplex pump at one end and a duplex at the other with gate valves every 1,500 feet along the 2½-inch pipe line. With these gate valves it was possible many times under ordinary operation to shut off the lines between the paver and the smaller pump, using the duplex pump on the sprinkling line and triplex pump for supplying the paver. Taps were placed in the line every 250 feet for the paver hose. 23.6.47

How to Make the Construction Job Safe

By
Edgar N. Goldstine

State Compensation Insurance Fund of California
San Francisco, Calif.

THOSE of us who have had practical experience in running a construction job know that we cannot get very far without a set of plans and specifications. The more complete the blueprints are in all their details, the easier it is to avoid errors and difficulties in the work. Those of us who have thought seriously and at length about preventing accidents recognize that it is equally essential to plan thoroughly for safety if we want to obtain gratifying results. The very first step in this direction begins with a strong feeling that might be expressed in this form "I want to stop injuries to the men engaged on our work. I will plan to do everything reasonably possible to protect our employees."

It is a cold and cruel inescapable fact that most contractors never take this first step. When a contractor who pays 173 per cent of the manual insurance rate because of consistently bad experience says that he is sincerely interested in safety but won't join the National Safety Council because his organization knows all about accidents, he is only kidding himself. He is paying for it besides. And there are entirely too many like him. Such men wish they could stop accidents but they do not truly want to do so. Action always follows genuine earnest desire. The type of man I am talking about is mentally unconscious insofar as honest effort for eliminating hazards is concerned. If they were awake they would learn from every possible source and would gladly join the fellowship of the Construction Section of the National Safety Council as soon as they heard about it.

The second step begins with an inquiry: "How can I effectively plan for results in accident prevention?" Right at this point is where safety programs everywhere display a fatal weakness. Most of us do not know what to do nor how to do it, and we are not trying hard enough to learn.

We cannot plan for results until we understand clearly just what needs to be done. The experience of the past is the most reliable index of the possibilities of the future. We can examine our accident records, classify them, study them, analyze them. Then, if we will use plain common sense we can determine what is needed to improve our situation for the future. In this way we develop our ability to use the imagination constructively—in a word, vision. Physical events become the test and measure of reality. Every failure, the consequence of our lack of understanding, enables us to learn how we may adapt ourselves to similar conditions when they again arise—provided we are willing to obtain instruction from this source. Only through slow and sometimes painful learning can we prepare to allow in advance for the limits of success and appreciate how we may avoid error.

When we get around to safe practices, more ability and experience is required to determine when work is not executed in a safe manner. Yet the competent foreman manages to know what is going on and will correct dangerous procedures. This refers with equal force to use of machinery, hand tools, wearing of safety goggles, safety shoes, safety clothing, scaffold construction and many other factors. You will probably find that at least ten accidents out of every hundred are chargeable to the neglect to use ordinary common sense rules regarding safe working methods. Safe practices pamphlet CN-1 of the National Safety Council has a great many practical suggestions that will serve as the foundation for any rules that your organization might want to work up for its own special conditions.

The most difficult factor to cope with is the personal equation of the individual worker. When men are tired mentally or physically, when their minds are not on their work, when they dislike their foreman, when there is a physical deficiency, when any of many such factors enter into the picture you have a tendency towards accidents. Such men should not be employed under such conditions on hazardous operations that require concentrated attention, until they recover. Where men of subnormal ability are engaged, and occasionally we must use them whether we like it or not, the best that we can do is to restrict their employment to the least dangerous work and supervise their activities very carefully. Some of the factors having a significant bearing on accident causation have been touched upon in this discussion. When we appreciate them we can see what needs to be done and can organize our efforts for concrete results. Here then is our formula for safety: Learn—and live! When all of us in the construction industry truly have the clear conception of this basic principle and put it to work, when we acquire the vision that it implies, it will become a simple matter to make the construction job safe.

From an address presented before the Construction Section, National Safety Council.

The New Fulton Road Bridge

A NEW seven-span bridge structure has recently been completed to provide a new West Side traffic artery for the city of Cleveland. The Fulton Road Bridge was built by the Hunkin-Conkey Construction Co., Cleveland, Ohio, and consists of seven arch spans of reinforced concrete. Its total length with approaches is about ½-mile. Each of the seven spans is made up of four ribs. The contract required 25,000 cubic yards of concrete, 1,800 tons of reinforcing steel and 42,000 barrels of cement. The approximate cost was $1,100,000.

The cableway used on this job, erected under the supervision of A. J. Eldridge of Columbus, Ohio, was designed for loads up to 12½ tons, with a length between spans of 1,850 feet. The track cable used was a 2½-inch diameter Hercules Red-Strand wire rope which was used originally by the city of Minneapolis several years ago for erecting the Third Avenue Bridge in that city and was later used on the Cedar Street Bridge in Minneapolis. All of the operating lines on this cableway were also Hercules wire rope, furnished new.

A Well-Meant Warning Sign—But Why Mention the "Deputy Sheriff"?

Construction Industry News

Federal Motor Truck Co., Detroit, Mich., has announced the appointment of J. F. Bowman as Vice President in charge of sales. Mr. Bowman was General Sales Manager of Federal for a number of years and later was identified with the Garford Motor Truck Co. for five years. For eight years he operated successfully as a distributor for a well-known line of passenger cars and trucks.

Tuthill Spring Co., Chicago, Ill., has announced the appointment of the following distributors for Tuthill highway guard: Virginia, Joseph S. Potts Jr. & Co., Travelers Bldg., Richmond, Va.; Arkansas, R. B. Gress, P. O. Box 504, Little Rock, Ark.; Texas, Browning-Ferris Machinery Co., 205 Exposition Ave., Dallas; Utah, C. H. Jones Co., 134 Pierpont Ave., Salt Lake City; Wyoming, The Robert T. Twedt Co., 15th and Pioneer Sts., Cheyenne, Wyo.; Louisiana, Mississippi and Alabama, Orleans Materials & Equipment Co., 213 Pan American Bldg., New Orleans; Maryland and Delaware, D. C. Elphinstone, Inc., 115 So. Calvert St., Baltimore, Md.

Fred C. Klinkhamer, 1235 Otto Ave., St. Paul, Minn., is now distributor of Duplex motor graders in western Wisconsin, Minnesota and South Dakota. He is interested in handling other non-conflicting lines in this territory.

Williamsport Wire Rope Co., Chicago, Ill., has recently been licensed to manufacture preformed wire rope under the patents of the American Cable Co.

Canadian Equipment Co., Ltd., Montreal, Que., has announced the removal of its offices from 1111 Beaver Hall Hill to its plant at Bois Franc Road, St. Laurent. It is felt by the officers of the company that this consolidation of offices and plant will facilitate service to customers.

Four-Wheel Drive Auto Co., Clintonville, Wisc., has announced the appointment of T. G. Shedore, former manager of the National Accounts Department to the position of assistant sales manager. Mr. Shedore has been a member of the FWD organization for the past sixteen years and has advanced from the position of a mechanic in 1917 to his present capacity in the sales department.

The LaBour Co., Inc., Elkhart, Ind., has announced that Leo Sanders, general contractor, Oklahoma City, Okla., was the winner of the No. 15 WPD gasoline engine-driven self-priming centrifugal pump unit mounted on a 2-wheel steel truck which was awarded for the nearest estimate of the number of reprimes of a pump exhibited at the Road Show in the Detroit Municipal Airport during the Highway and Building Congress, January 16-20.

Machine Production and Laying on a 24-Mile Black Top Job

(*Continued from page 30*)

to the working time of this roller through eliminating frequent trips to secure water. The 3-wheel roller was used for the sealing or initial rolling which provided maximum density while the material was at its maximum heat. In addition the larger radius wheels lessened the chance for waves or bumps in the surface.

PERSONNEL

The Wesco Co., Chattanooga, Tenn., was contractor for this 24.75-mile hot-mix resurfacing job and the work was in charge of Manuel Russ, Superintendent with W. E. Alley as Asphalt Street Foreman and D. B. Jones as Asphalt Plant Foreman. For the Ohio State Department of Highways the work was done under the direction of Charles Ash, Division Engineer and C. R. Haines, Assistant Division Engineer and R. F. Burgess, Project Engineer.

Five Major Bridge Projects Nearing Completion in Minnesota

WHILE the extension of pavements and the bituminous treatment of many miles of graveled road surfaces have been carried on in Minnesota, five major bridge projects have been nearing completion, according to a recent state highway bulletin. The five bridges, while not ranking with the really great bridge projects of the state, are of sufficient size to make them outstanding achievements in the program of state work.

The longest of the five is a bridge over the St. Louis River on trunk highway No. 8 at Brookston. It is 818 feet in length and consists of three 150-foot deck truss spans, three 50-foot, two 54-foot, two 40-foot and one 20-foot I-beam spans. The driving width of the bridge floor, which is of concrete, is 28 feet. The piers and abutments are of concrete. Piling was used under four river piers and two abutments. The contract price of the structure was $77,827.00. Shorter in length but more costly to construct is the bridge over the Mississippi River at Brainerd on trunk highway No. 2, and over which all traffic to and from trunk highway No. 19 to Walker, Cass Lake and northward will travel. This bridge, 630 feet in length, consists of three 115-foot arch spans and two 82-foot arch spans. The bridge floor provides a 40-foot roadway and two 6-foot 6-inch sidewalks. It is composed entirely of concrete with the exception that where concrete piles are used under the abutments, wooden piles and steel rails are used to provide the footings for the piers. The state furnished the cement for the structure, the contract price of which, including provision for lighting, was $182,975.00.

Another of the bridges is on trunk highway No. 15 over the Big Cottonwood River at New Ulm, which has a total length of 644 feet. This consists of four 125-foot deck truss spans and two 60-foot deck plate girder spans. The concrete flooring affords a 28-foot roadway. The contract price was $69,693.00. The bridge over the Little Fork River at Pelland is 540 feet long, consists of three steel spans 180 feet in length, and has a 24-foot concrete roadway. The contract price for the erection of the new bridge and the removal of the old one was $63,480.00. The last of this group of five is the new bridge at Grand Rapids, which is 160 feet long and consists of one 100-foot concrete arch span. It provides a 40-foot roadway and two 6-foot 3-inch sidewalks. The contract price for this structure which also included provision for lighting and a temporary crossing for traffic while work was in progress, was $62,436.00.

In addition to these five bridges, trunk highway improvement work included the erection of forty-eight other bridges and the widening of thirty-five more recently. Contracts have also been let for the erection of nine new bridges and the widening of one. Plans have also been furnished by the State Highway Department to counties for nineteen State Aid bridges.

A.E.D. Plans Increased Activity

AT the Annual Meeting of the Associated Equipment Distributors held in Detroit, January 15 and 16, the association laid definite plans for extending its membership in a new field during 1933. A committee has been appointed to select about one hundred of the well-known equipment manufacturers and to solicit them as allied members of the Associated Equipment Distributors. This type of membership is desired in order that the A.E.D. can work more intensely on the problems with which it is confronted in fighting gas tax diversion and other types of legislation that are destructive to this industry. It is felt that in having the manufacturers join with the equipment distributors, the construction industry will be able to present a more united front and a greater recognition will result.

A. C. Blaisdell, secretary of the Associated Equipment Distributors, reports that during 1932 the Association was called upon to participate in legislation on the uniform mechanics lien act which resulted in the expenditure of a great deal of time and money to bring it to its present state.

During the annual meeting the following officers and executive committee were elected for the coming year: President, Carl E. Baker, Smith-Booth-Usher Co., Los Angeles; First Vice-President, R. R. Nixon, Nixon-Hasselle Co., Chattanooga, Tenn.; Fred Mattheis, Hedge & Mattheis Co., Boston, Mass.; Secretary, A. C. Blaisdell, Queen City Supply Co., Cincinnati, Ohio; Treasurer, H. W. Fletcher, Fletcher Equipment Co., New Orleans, La.; Executive Committee: G. F. Lowe, Chicago, Ill.; J. C. Louis, John C. Louis Co., Inc., Baltimore, Md.; J. S. Gilman, Ziegler Co., Inc., Minneapolis, Minn.; Goodloe Yancey, Yancey Bros., Inc., Atlanta, Ga.; Roy Nelson, Howard-Cooper Corp., Portland, Ore.; and T. S. McShane, American Machinery & Supply Co., Omaha, Neb.

Racing with Winter Weather

A ROAD contractor recently completed a race with winter on a contract located 10,000 feet above sea level. The job consisted of several miles of grading and the construction of one river bridge and three months ago it did not seem likely that he could finish the work before freezing weather set in. His crew was working night and day and every day meant that the frost was penetrating further into the ground, making operations more and more difficult.

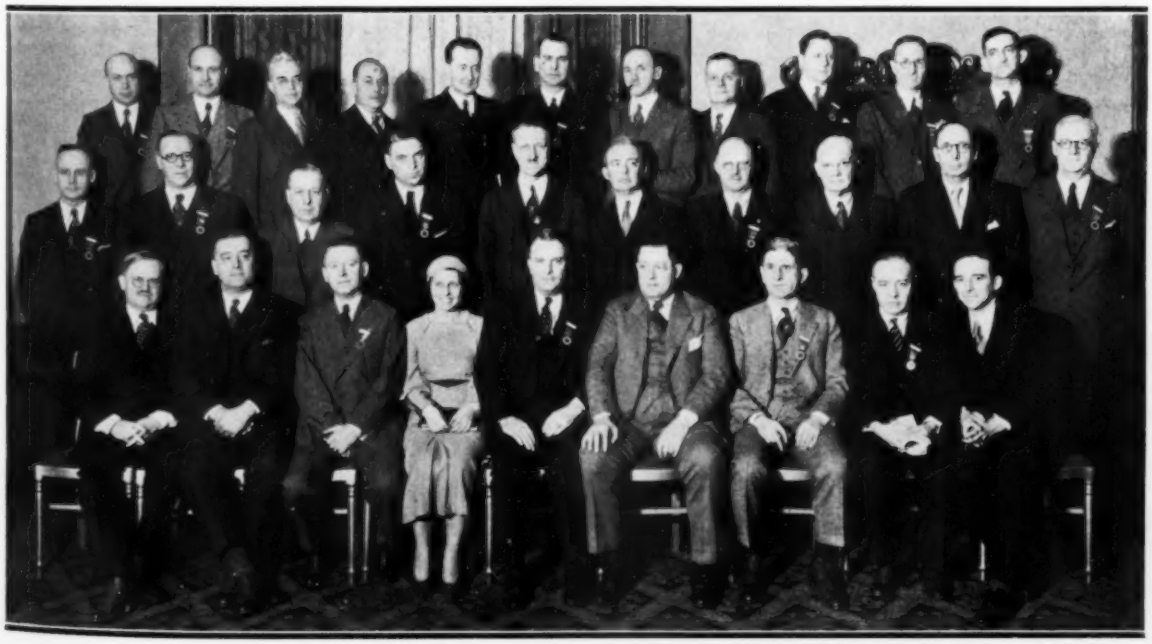
Due to the severe digging and rough going, the steam shovel bucket factured next to a riveted seam and it seemed impossible at the time to make a repair that would get work started again. A new shovel was ordered, but delivery could not be made in time to complete the work. Consultation with an oxy-acetylene service operator, however, saved the day. The bucket has worn thin in spots, and the fracture was about 18 inches long. The contractor's welder first repaired the fracture and then built up the worn spots in the metal with High Test steel welding rod.

New Los Angeles Reservoir

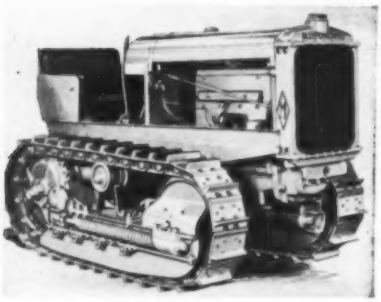
LOCATED almost directly north of Los Angeles, Calif., a distance of approximately 75 miles, lies the deep and narrow valley known as the Bouquet Canyon. At the summit, at an elevation of about 3,650 feet, the Department of Power and Water of the City of Los Angeles is now building a reservoir with a capacity of 35,000 acre-feet, for impounding the waters brought down to it by aqueduct, from the high Sierras in the Owen Lake regions about 300 miles north of the city. This reservoir will replace the old St. Francis reservoir, the dam of which collapsed in March, 1928. The water is to be impounded at Bouquet Canyon and is intended for domestic use only. No power will be generated.

The dam will be constructed with an earth fill, faced with stone, with side slopes of 3 to 1, a height of 200 feet, and a width of 50 feet at the top. Over 3,000,000 yards of dirt has to be moved. The material is hauled in by crawler trucks of 8-yard capacity, spread by Caterpillar tractors and Le Tourneau bulldozers and tamped with sheepsfoot rollers. The project will cost $4,500,000 and require two years to complete.

The present work is the construction of Bouquet Canyon County Road which makes a high line over the crest of the dam. Two 1¾-yard Link-Belt diesel shovels are at present working on this job, loading to Mack trucks. As soon as the road is completed these shovels will be moved into the borrow pit to be used for excavation in the dam. The Mono Construction Co. is the contractor for the road.



A. E. D., January 16, 1933. *Members and Guests at Annual Meeting.*



The New Model M Allis-Chalmers Track Tractor

A New 28-Horsepower Crawler Tractor

A NEW track-type tractor which represents years of research and engineering and which has been tested in every way possible to demonstrate its ability to stand up under hard continuous work has been announced by Allis-Chalmers Mfg. Co., Tractor Div., Milwaukee, Wis. This new Model M follows the general design of the A-C Model 35 and Model L. It is modern in every feature and is equipped with four speeds forward, renewable cylinder sleeves, unit construction and steering clutch control. Ample power is furished by an engine which will deliver approximately 28 drawbar horsepower. The Model M weighs 6,200 pounds and the track shoes are 12 inches in width.

The wide variation of speeds from 2.23 to 5.82 miles per hour increases the tractor's range of usefulness. It can work at high speed in loose or wet soil and handles readily in close quarters. Its overall length is 101⅜ inches and overall width 57¼ inches. The height of the tractor from the ground to the top of the radiator is 56-3/16 inches.

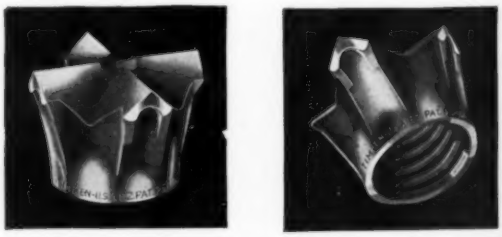
A Dragline Bucket for Use on Levees and Similar Jobs

ONE of the most severe tests to which a dragline bucket can be subjected is the continuous service on levee construction where contractors are working their equipment 22 hours a day in two 11-hour shifts, with but one hour off in each shift for greasing, oiling and adjustments if needed. Breakdowns in equipment are costly and more and more contractors are demanding equipment which will stand up under this unusually grueling strain, as well as giving the maximum payloads with the resulting bigger output per day of service.

With these requirements in mind, the Wellman Engineering Co., 7012 Central Ave., Cleveland, Ohio, has developed an improved Williams DL dragline bucket which is not only designed to withstand such severe service but which incorporates many new features and improvements. Among these features are the welded stiffeners extending the full length of the bucket on the outside, interlocked with the bail attaching brackets, a cantilever type of construction which prevents the pulling in of the lower front corners. A quick-opening hinged hitch permits the use of a solid one-piece attached clevis and enables the operator to set the drag chains quickly at the best digging angle for the kind of work to be done. The side walls are reinforced with an angle welded to the plate between the arch and back strap and it has a special box-section steel casting arch. This bucket is fitted with Williams teeth having reversible points and the lip is of special heat-treated steel. It has the tubular design of spreader bar with improved end fittings, and also a special three-way swiveled link and improved sheave block.

The Improved Williams DL Dragline Bucket for Levee Work

Another feature is the wearing shoes which are forged or welded to the sides of the contacting chain links, for bearing against strips provided on the sides of the bucket. One other feature is the drag cable socket which has two hooks, or spurs, on the inside for attachment of the rings at the front ends of the main drag chain. Since these rings are attached to the spurs, any wearing will take place between the casting and the rings and none will occur on the pin. The bucket has not been increased in weight, and is now available in sizes ranging from 1¼ to 3 cubic yards rated capacity.



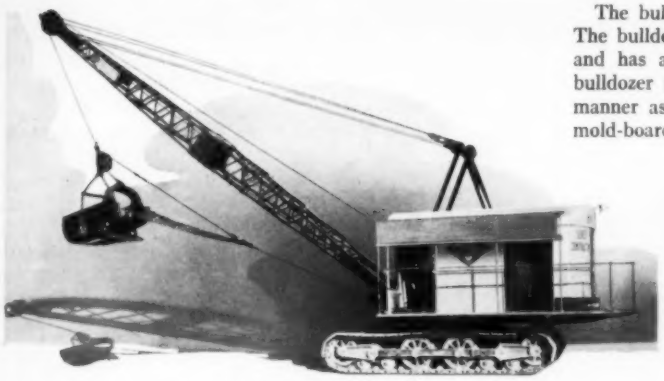
Timken Detachable Rock Bits, Showing the Thread for Attaching to the Steel

Detachable Bits for Rock Drills

DRILLING rock for blasting has always been an expensive operation, involving a large investment in drill steel, resharpening equipment, labor and transportation. Recently, the Timken Roller Bearing Service & Sales Co., Bit Division, Canton, Ohio, announced the Timken rock bit which is designed to effect savings in drilling costs.

The Timken rock bit replaces the conventional bit which is forged on the end of hollow drill steel. It is held tightly against an upset shoulder on the steel by means of a special thread designed for strength and easy detachability. This left-hand thread is opposed to the direction of rotation of the steel so that the bit is kept tightly against the shoulder while drilling. The hammer blow is transmitted from the steel through the shoulder to the body of the bit. When the bit becomes too dull for further service, it is merely detached and replaced with a new one.

According to the manufacturer, Timken rock bits drill farther and last longer, which results in an increase of 15 to 30 per cent in production. The longer drilling life of the bit is due to two factors, materials and design. These bits are especially designed for faster drilling. The material used is a special grade of Timken fine grained high carbon alloy steel made in electric furnaces and heat-treated to get the maximum strength, life and wear resistance.



The New Lima Type 601 Heavy-Duty Dragline

A New Heavy-Duty Dragline for Drainage and Levee Work

THE new Lima Type 601 heavy-duty dragline, recently announced by the Ohio Power Shovel Co., Lima, Ohio, is designed for fast and profitable digging on drainage and levee projects. Features in the design of this new dragline are helical gears to insure smooth and economical operation, the extra large diameter of the drums, 32 inches for a 1-inch cable, mounted on alloy steel shafts and rotating on roller bearings, independent clutches making it possible to hoist, travel, swing, steer, raise or lower the boom all at the same time. These clutches are of the synchro-power type, easy to operate and requiring only enough pressure to apply the power which is taken from a toggle-operated mechanism on the drum shaft.

The crawlers are 16 feet 3 inches long, with 30-inch treads, providing a low bearing pressure. Their ends are sufficiently elevated to enable them to climb through mud and over logs, steering being accomplished from the cab with the rotating frame in any position. Full power is available to either crawler. Capacities are supplied in 1½ or 2 yards, depending upon the length of boom used. The boom is of alloy steel, lattice type, ranging in length from 40 to 70 feet. The fairlead consists of four large sheaves mounted on roller bearings and attached to the revolving frame. The power plant is a 120-horsepower gasoline engine, for which a diesel engine may be substituted when desired.

A New Front-End Fresno for Tractors

A MACHINE that will dig, load and transport earth on a 150-foot haul at the rate of 30 cubic yards per hour has been announced by the Anthony Co., Inc., Streator, Ill. This Anthony multiple-tool digger is built in two heights for Caterpillar Twenty-Five tractors. One, a standard size, has a clearance of 6 feet 6 inches and the other, a special, has a high lift of 8 feet 6 inches. The boom mounted on the front of the tractor is raised and lowered by hydraulic power to facilitate housing the unit. Either one of these loaders can be converted into a front-end fresno or bulldozer by simple interchange of parts. The low-lift or front-end fresno-type can be converted into either of the loading machines by raising the head and installing the two boom sections. The high-lift loader can be converted into the front-end fresno by removing a section of the boom. The tools are interchanged by removing the nuts from four bolts which hold the tools to the dolly that rolls in the boom track.

The bulldozer unit can be used for moving earth or snow. The bulldozer mold-board will cut 5 inches below track level, and has a clearance of 54 inches when raised. The 6-foot bulldozer mold-board is controlled by the hoist in the same manner as the shovel and either edge can be tipped and the mold-board can be set at any angle.

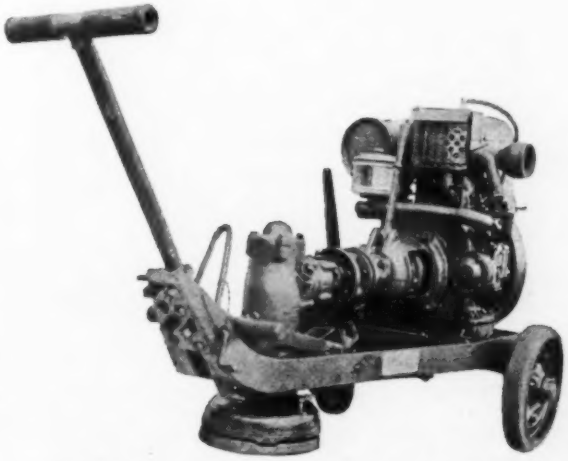
A New Concrete Surfacer

THE Hill surfacer for removing irregularities on concrete and bituminous concrete pavements has recently been announced by the H & H Manufacturing Co., Elyria, Ohio. This machine, which is ruggedly constructed and weighs 550 pounds, is mounted on 12-inch roller bearing rear wheels with 2½-inch rubber tires. The handle is adjustable to accommodate the operator.

A Twin Disc clutch permits easy inspection and change of the cutter head without stopping the motor, which is equipped with an oil bath air cleaner. The horizontal movement of the adjustable axle permits the operator to regulate the weight on the cutter head, making the machine easily adaptable to working conditions. The vertical movement of the adjustable axle permits the use of the machine for grinding curbs up to 7 inches above and gutters 2 inches below the plane on which the rear wheels rest, without any change of wheel size. The machine is equipped with a towing hitch for moving it short distances on its own wheels. A caster support with a foot release permits raising or lowering the machine from the operating position. It has a 10-inch diameter cutting head and the cutters are 3 inches in diameter, ¼-inch thick and processed to insure long life. A 10-inch diameter rigid or flexible abrasive wheel mounting interchangeable with the regular cutting head can be supplied in any grit.

The Hill surfacer is equipped with the latest type air-cooled 5-horsepower Wisconsin motor with impulse-coupled magneto, has Timken bearings throughout, heat-treated bevel gear drive running in oil bath with oil circulation to all the bearings by means of a centrifugal pump integral with the gear housing, insuring constant lubrication.

With this machine, the Peerless Construction Co. of Fremont, Ohio, was able to correct 131 surface irregularities of a concrete road and plane down two bridge abutment tops in 2½ days, using only 16 cutters.



The Hill Surfacer for Removing Irregularities in Concrete Pavements

Rex-Watson Tractor-Hitch Wagon Carrying a Load

A New Type of Dump Wagon

A NEW dumper which is the result of several years of development has recently been announced by the Rex-Watson Corp., Canastota, N. Y. This unit is used with any make of industrial tractor and can be run singly or in tandem. While made in a variety of sizes, the 3-yard unit is the most popular size, especially for use in tandem.

These dumpers are equipped with bottom dumps, automatic winding devices, bodies of heavy hard wood thoroughly reinforced with steel plates, and wheels fitted with Timken bearings for high speed work. Features of this unit are the low cost, the saving in haulage cost, the lowered time to maneuver, spot and dump the load, the low center of gravity of the tractor and dumper and its ability to go through a narrow opening. It is claimed by the manufacturer that with several units running in a circle from the shovel to the dump and over it, it is possible to move from 220 to 250 yards per day per unit.

These Tractor-Hitch dumpers are equipped with either steel or rubber tires. The advantages of the rubber tires, Goodrich Zero Pressure tires being standard equipment, are the speeding up of operations and the elimination of lost time because of tire trouble, as these tires cannot go flat.

THE WATER CLARIFYING PLANT AT HOOVER DAM

Eighty-five per cent of the water used by the 500-ton per hour aggregate plant is pumped back to this 800,000-gallon water treating reservoir where Dorr equipment, powered by Westinghouse electric motors, removes the silt and reduces the turbidity so that the water can be used again and again

A Hydraulic Scraper for Hard Digging

A NEW Crescent hydraulic scraper, which can be used behind a tractor for grading, cut and fill and other dirt moving work, has recently been announced by Sauerman Bros., 464 So. Clinton St., Chicago, Ill. This new scraper has the features of the regular line of Crescent buckets in the cable-haulage scraper operation. The curved design gives the wearing blade a continuous plow-share action, so that the bucket digs its own load without plowing or other preparation, and at the same time permits the use of a relatively large bucket for a given line pull. The construction of this bucket also gives it an automatic regulation of the depth of its cut, varying with the hardness of the soil, a feature designed to reduce the line pull required to load the scraper.

The scraper is dumped, without stopping the tractor, by simply transferring the pull from the bottom to the top of the bucket, by means of a hydraulic plunger actuated by a pump mounted on the hoist. By means of the hydraulic control, it is also possible for the operator to control the depth of digging. Likewise the operator can control the depth of the dump, dumping all in one place or spreading to any desired depth.

The Crescent Scraper with Hydraulic Dumping Arrangement Operated by a Tractor

The tractor moves ordinarily in a continuous forward motion, without stopping for the dump, though it can be backed up if desired. The scraper will travel over any ground that the tractor will travel.

These scrapers, which are simple and rugged in construction, with manganese steel teeth and renewable blades, are available in various sizes for operation with tractors for all sizes and makes.

A Bigger Bulldozer for Bigger Tractors

A NEW hydraulic-operated bulldozer has been developed by the LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa, to be used on the Caterpillar Sixty-five tractor. This bulldozer is ruggedly constructed and has been designed to give both up and down pressure on the blade. It has an extreme high lift of 34 inches above ground level and an 18-inch drop below ground level. It has been designed so that the tractor drawbar is in the clear at all times, enabling the tractor to be used for hauling wagons, tampers, scrapers, and other equipment without removing any part of the bulldozer.

Special shock absorbers are provided to take up any sudden jolts before they are transmitted to the operating mechanism, in order to minimize the chances of breakage and assuring ease of operation. The LaPlant-Choate Hylift bulldozer is hydraulically controlled, the control lever being placed within convenient reach of the tractor operator.

The Adnun Black Top Surfacer in Action

A Black Top Paver

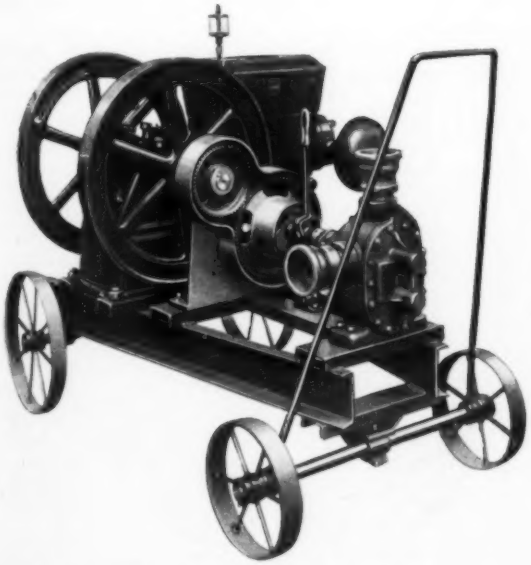
A MECHANICAL asphalt spreader which lays a complete black top road has been placed on the market by the Adnun Engineering & Mfg. Co., Nunda, N. Y. This 5-ton Adnun Black Top Paver is of the four-wheel drive type with rubber-tired front wheels extended well ahead of the hopper to secure a relatively long wheelbase. The rear portion of the machine is carried on large diameter wide face rollers and power is supplied by a 24-horsepower motor.

A steel hopper 10 feet in width extends across the central portion of the machine. The hopper has an adjustable front end for varying the width of the opening at the bottom and regulating the flow of material from the hopper onto the subgrade. Parallel with the opening in the bottom is a raker bar with teeth pitched at an angle so as to spread the material evenly throughout the length of the hopper, break up any lumps and assist the flow of material from the hopper.

Directly at the bottom and rear of the hopper is a reciprocating cutter bar having undercut beveled teeth, not unlike those on the mowing machine, which cuts off the material as it comes from the hopper and passes over it, compressing and leveling it off in measured thickness. The cutter bar is carried on heavy springs and is adjustable for varying the thickness from ½ to 3½ inches also for crowning and banking curves. When the adjustment is once set, it will continue to produce the same thickness of material until changed.

This mechanical asphalt spreader will use material which has become lumpy due to long hauls or storage in cars. The machine has two working speeds, one of 10 feet per minute and one of 25 feet per minute. It therefore has a capacity to lay 600 feet per hour in low speed or 1,500 feet per hour in high. In addition to the operating speeds both forward and reverse, it has a traveling speed of 150 feet per minute for moving from place to place.

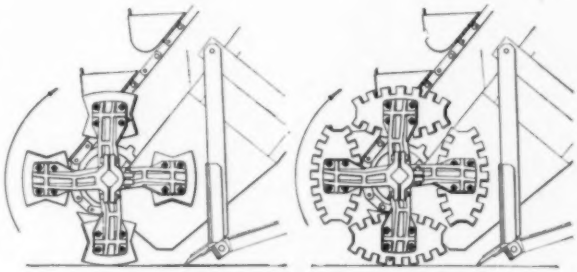
To load the hopper the supply truck backs up between the front wheels, which run inside the shoulder on the subgrade, dumping approximately 3 tons into the hopper. The usual 6 to 8-ton trucks ordinarily dump three times. It is possible, however, to fill the hopper while the paver is spreading material, by coordinating the speed of the paver and the truck.



The State of Kentucky Is Using More Than Twenty of These Roper Roadbuilder Engine and Pump Assemblies Made by the Stover Mfg. & Engine Co., Freeport, Ill.

A Bucket Loader with an Improved Feeding Device

AN improved feeding device has recently been announced for the Haiss bucket loader, manufactured by the Geo. Haiss Mfg. Co., 142nd St. & Park Ave., New York City. The revolving paddle feeding device which has been a characteristic of Haiss loader design has now been equipped with new form paddles in which a renewable tip is an integral part of the design. The separable paddle tips are not only renewable, but also reversible, so that when the original outer edge is worn down, the tip piece may be reversed and a new unworn edge brought into play.



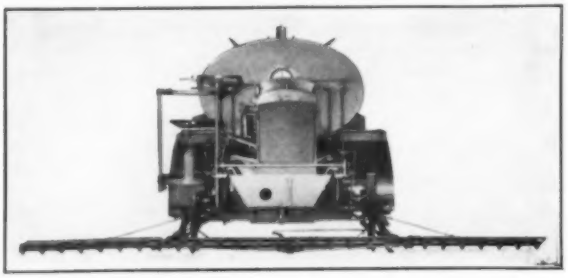
Diagrams of the Renewable Paddle Tips on the Haiss Portable Bucket Loader

These tips are made in two forms, a smooth edged design for handling stone, gravel and similar material and the serrated edge paddle for excavating and handling top soil.

A Line of Diesel-Powered Trucks

A LINE of thirteen diesel-powered trucks has been announced by the Sterling Motor Truck Co., Milwaukee, Wis. The new models range in capacity from 4 tons upwards and are designed for all types of heavy-duty service, including road building, excavating work, and hauling and transportation. There are also special chain-drive diesel-powered models in addition to the conventional type of enclosed rear drive.

According to the manufacturer, tests have showed that fuel costs can be reduced from 60 to 75 per cent by the use of diesel engines. Another feature is that this type of engine develops greater lugging power than comparable gasoline motors.



The Etnyre Model FO2C 800-Gallon Distributor with the Circulating Spray Bar in Operating Position

A Bituminous Distributor with a Circulating Spray Bar

A NEW feature of the Etnyre bituminous distributor is the circulating spray bar, each nozzle of which is equipped with a valve to prevent drip after spraying. This spray bar is supported on universal brackets and the pipe connections are made up with ball joints so that it can be raised, lowered and swung 9 inches to the right or left of the center. The spray bar is made up in sections, the center section being made of a 3-inch seamless steel tube welded at each end to one of the branches of a Y-shaped header. The end sections are made up in 2, 4, 6 and 8-foot lengths of 2¼-inch seamless steel tubing and these end sections are connected to the header by the use of a hinged connection which turns on a tapered seat. The connections on the end section permit extending the bar to any desired length, although this is not necessary in order to spray a narrow strip as any nozzle or group of nozzles can be thrown out of service by disengaging any level or section of levers on the nozzle valves.

Although the spray bar is of the circulating type, it is not necessary to circulate the material through the bar during the process of heating as it is connected at each end of the center section to a three-way valve on the primary circulating system. This primary system, which is completely enclosed in a metal housing, is used not only for circulating material to distribute the heat uniformly throughout the load and to provide agitation to prevent coking, but also for filling the tank. The only time the material is circulated through the spray bar is preparatory to spraying and then only long enough to warm up the valves for easy operation.

The two three-way valves on the primary circulating system and the nozzle valves are linked together and are controlled by a single lever provided with a latch that engages either one or two other levers. There are but three operating positions of the levers. The raising, lowering and shifting operations as well as the valves are controlled by levers located convenient to the operator's seat which is placed at the rear end on the left side of the frame in an elevated position where the operator is in a position to see the ends of the sprays.

With the Etnyre distributing system the pump acts as a meter and accurately measures the material delivered to the nozzles at all operating speeds, temperatures and pressures. A two-speed tachometer which is driven by a fifth wheel and which is used only when spraying has also been developed by this company. In the low range, the tachometer registers from 0 to 600 and in the high range from 600 to 1,200. A reading of 100 corresponds to a road speed of 1 mile per hour, 200 to 2 miles per hour, etc.

After the load is distributed the intake valve is turned to the filling position and the pump forces air through the spray bar which carries the material in the bar back into the tank. The end sections are raised so that the material in the end sections flows down into the center section. In this way the entire bar is cleared with the exception of a pint or two, which may adhere to the walls of the bar.

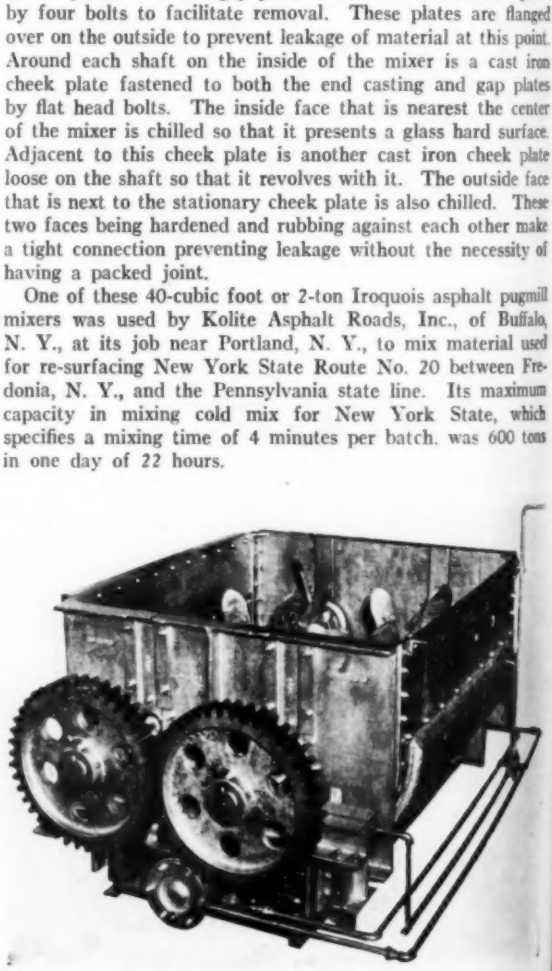
This circulating spray bar is interchangeable with the regular spray bars on all Etnyre Model F and M distributors, made by E. D. Etnyre & Co., Oregon, Ill., and any machine in the field can be equipped with this new spray bar at a small expense.

A New 2-Ton Asphalt Pugmill Mixer

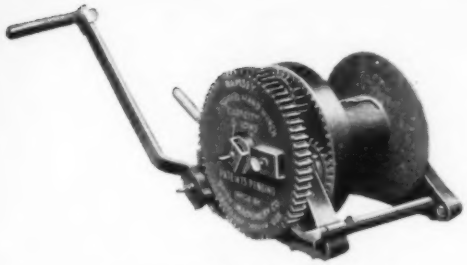
A PUGMILL mixer with a double slide giving a larger opening which permits quicker discharge of the material from the mixer has been announced by the Iroquois Works, The Barber Asphalt Co., Philadelphia, Pa. The slide gates are castings fitted with manganese steel liners and form the entire bottom of the mixer. One slide liner is longer than the other so that when the gates are closed the long liner extends partially over the other slide, abutting the shorter liner and thereby preventing leakage at the center. Since part of the slide, when opening, passes out of the mixer, cast iron slide scrapers fastened to the end casting inside of the mixer to sweep the slide clean are provided. Each slide moves on two series of three steel slide rollers, equally spaced and the rollers move on two steel rails supported under the mixer and well out of the way of the material being discharged.

The end castings are equipped with slots into which are fitted special cast iron gap plates which are fastened in place by four bolts to facilitate removal. These plates are flanged over on the outside to prevent leakage of material at this point. Around each shaft on the inside of the mixer is a cast iron cheek plate fastened to both the end casting and gap plates by flat head bolts. The inside face that is nearest the center of the mixer is chilled so that it presents a glass hard surface. Adjacent to this cheek plate is another cast iron cheek plate loose on the shaft so that it revolves with it. The outside face that is next to the stationary cheek plate is also chilled. These two faces being hardened and rubbing against each other make a tight connection preventing leakage without the necessity of having a packed joint.

One of these 40-cubic foot or 2-ton Iroquois asphalt pugmill mixers was used by Kolite Asphalt Roads, Inc., of Buffalo, N. Y., at its job near Portland, N. Y., to mix material used for re-surfacing New York State Route No. 20 between Fredonia, N. Y., and the Pennsylvania state line. Its maximum capacity in mixing cold mix for New York State, which specifies a mixing time of 4 minutes per batch, was 600 tons in one day of 22 hours.



The New Iroquois Pugmill Mixer



The Ramsey 3-Speed Hand Winch

A New 3-Speed Hand Winch

THE Ramsey 3-speed hand winch, of 5-ton capacity, which is a compact, compound-geared hand winch, with a wide range of speeds and large factor of safety, has recently been announced by the United Machinery Co., Portland, Ore. The overall dimensions of this winch are 16 x 17½ x 13½ inches and its weight is 150 pounds. The speed and capacities are as follows: with a 25 to 1 ratio, the capacity is 10,000 pounds and with a 4 to 1 ratio, the capacity is 1,500 pounds. A 1 to 1 ratio is used for rewinding the cable. Speed change is simple, accomplished merely by shifting the hand lever to various positions provided. The drum holds 200 feet of ⅝-inch cable.

The factor of safety is provided by the fact that the load is applied to three teeth on the pinion and three teeth on the drum gear, a feature which provides not only great strength, but long life.

A Two-Way Dump Wagon for Handling Rock and Dirt

THE new Euclid Tu-Way dump wagon, recently announced by the Euclid Road Machinery Co., Cleveland, Ohio, is designed to handle rock as well as dirt economically. With a fair crown, this wagon carries 10 yards and is easily handled by a Caterpillar Fifty, most of the time in high gear. With a 50-horsepower tractor, the Euclid Tu-Way can turn in a roadway width of 22 feet, thereby eliminating the necessity of rear-end dumping on practically all types of jobs. The short turning radius makes it easy to dump over the end of fills and enables turning on narrow roadways without backing. The low body height makes backing, when necessary, very easy.

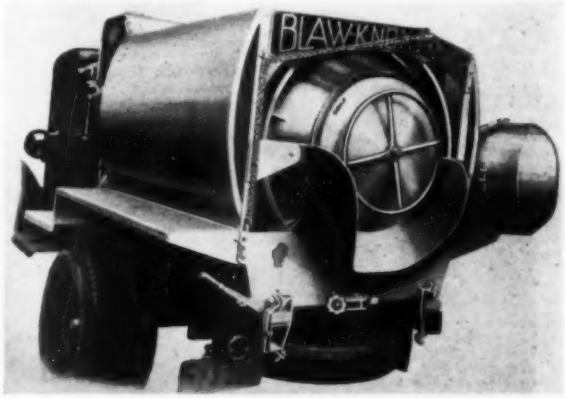
The New Tu-Way Dump Wagon

One of the features of this new dump wagon is its one-piece body. This design makes it possible to build a body of great strength and rigidity, with much less weight. The body plates are extra thick and the floor is double-plated with 2-inch plank between. Other features are the standard Euclid rugged channel frame construction, the tubular draw-bar spring-type clevis and the 15-ton Track Wheels.

A New Line of Truck Mixers and Agitators

A LINE of truck mixers and agitators, rated in 1, 1½, 2, 3, 4 and 5-cubic yard capacities as truck mixers, and 1, 2, 3, 4, 6 and 7 to 8-cubic yard capacities as closed agitator bodies, has recently been announced by the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Penna. Each detail in the design of this new line has been developed with the purpose of obtaining the lowest possible maintenance cost, as well as extending the useful life of the mixers. Aluminum alloy castings have been used wherever feasible to reduce the weight to a minimum and roller and ball bearings used to reduce friction, power consumption and wear.

The power unit of this Blaw-Knox Trukmixer is entirely separate from that of the truck and consists of a Hercules 4-cylinder gasoline engine for all sizes up to the 5-cubic yard mixer. A 6-cylinder engine is used for the larger models. This power unit is equipped with air cleaners, which clean the air for both the carburetor and the crank case. The charging and discharge doors are ample in size and fitted with solid oval rubber gaskets. A unique arrangement of the mixing blades allows quick and effective mixing, as well as for quick discharge. These mixers are equipped with a one-man chute, which is carried on one side of the Trukmixer and is so arranged that one man can easily and quickly hook the chute in place beneath the discharge spout. Dual controls are provided for the operation of these mixers, which include a complete set of controls for the throttle, clutch and gear shifts at the front of the mixer and another set at the rear.



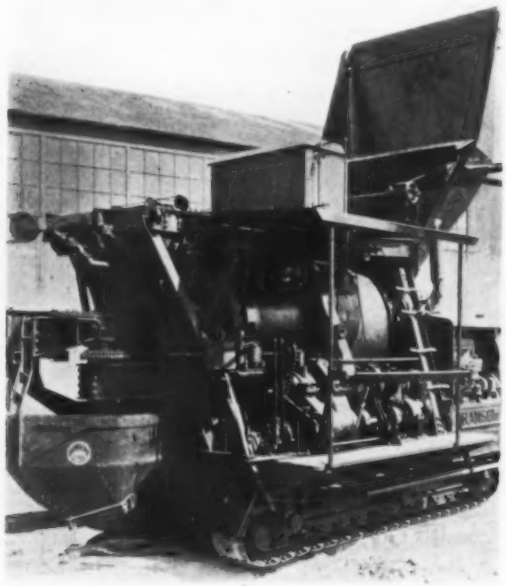
The Improved Trukmixer and Closed Agitator Body

In the water measuring system, the tanks are overhead with gravity feed into the mixer drum. A quick-acting valve is provided to control the flow of water. The measurement of the water is by the overflow system. A calibrated gage attached to one end of the tank is used for the setting of the indicator, this setting controlling the level of an overflow device inside the water tank. The tank is also equipped with a glass gage and another calibrated scale opposite the gage to show the amount of water in the tank. A pump may be added to speed up the flow of water into the drum. On the 1 and 1½-yard Trukmixers a centrifugal pump is used and on the larger models, a rotary self-priming type is recommended.

A New Double-Drum Paver

ANNOUNCEMENT has been made recently by the Ransome Concrete Machinery Co., Dunellen, N. J., of a new dual-drum paver. This new paver offers the increased production secured by the use of tandem pavers, with all operations synchronized by automatic control. This paver has two standard 27-E drums combined in one with a discharge chute between them, passing the materials from the first into the second. A batch is mixed half the specified time in the first drum, then is delivered to the second drum where it is mixed with the other half. The design is such that the mixing action is the same when the concrete is passing from one drum to the other as when it is all in one drum.

The overall dimensions, except the length, are the same as on the standard 27-E paver. The power loader, boom bucket, water tank and crawler construction are also the same, while the boom has a 25-foot spreading reach, and a 4-inch water line is used from the measuring tank to the drum. The length of the crawlers is increased but the bearing per square inch on the subgrade is less.

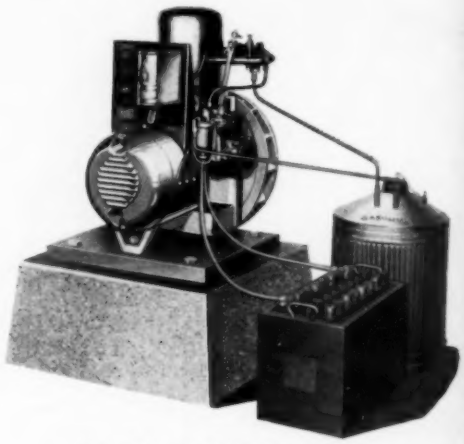


The New Ransome Dual-Drum Paver

According to the manufacturer, the Ransome dual-drum paver, with the batch meter set for 1¼-minute mix, placed 724 cubic yards while on the same job a standard machine placed 478 cubic yards in the same time. Only three additional men were required in the mixing crew to get the extra 246 cubic yards.

A Portable Generator for Construction Light and Power

A NUMBER of models of portable electric generating units in 800, 1,500 and 5,000-watt units with starting batteries, automatic control panels or non-battery plants have been developed by the Delco Appliance Corp., Rochester, N. Y. The Model 8M3 Delco-Light is of particular interest to contractors who have found this type of portable plant helpful in furnishing light for large power shovels, cranes and draglines and for lighting construction camps. This 800-watt generating unit is equipped with a 16-volt Exide starting battery and is a non-storage battery plant. It generates sufficient



The Delco Model 8M3 Generator

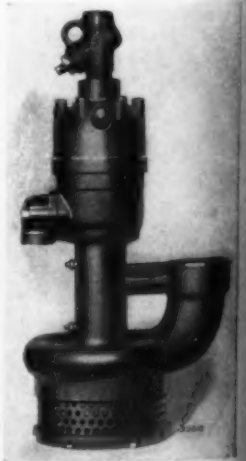
power to operate motors up to 1/3-horsepower. The engine is an air-cooled, valve-in-head, 4-cycle, single-cylinder unit of 1½-horsepower, with 2½-inch bore and 3-inch stroke. It uses battery ignition and is controlled by a fly ball governor and a simple, one-adjustment carburetor. A 2-gallon gasoline tank equipped with a dirt and water trap is furnished with the engine. The oil capacity of the crank case is 4 pints. The power for starting the plant is furnished by the 5-plate, 16-volt Exide starting battery which is kept charged automatically by the generator itself. The plant stops when the fuel tank becomes empty or can be stopped either at the plant or at a moderately remote location by a push button. The plant has an overall height of 24 inches, is 21 inches long and 21½ inches wide. The generator is direct-connected to the engine and furnishes 32-volt service with a full load output of 800 watts.

The new 5,000-watt unit starts when a 40-watt load is turned on and runs until all the load is turned off. This plant operates at 1,800 rpm delivering direct current at 150 volts.

A New Air-Operated Portable Sump Pump

A NEW portable air-operated sump pump has been developed by Ingersoll-Rand Co., 11 Broadway, New York City. It consists of an open-impeller type centrifugal pump driven by a multi-vane type air motor, both enclosed in one-piece housing. The unit weighs 50 pounds.

This pump, designated as sump pump size 25, is designed for use in pumping from sumps, trenches, manholes, caissons, cofferdams and similar work. The pump will handle clear or dirty water, oil, sewage or moderately heavy sludge. The pump is intended for lifts of 10 to 40 feet with an air pressure of 70 to 90 pounds, but is claimed to give satisfactory results under widely varying conditions of head and air pressure. Using air at 80 pounds pressure, the capacity ranges from 170 rpm with a 10-foot lift through 20 feet of 2½-inch hose to 125 gpm with a 40-foot lift through 50 feet of 2½-inch hose. The pump is self-priming as it has no suction lift, and must be submerged to cover the inlet screen.



The New No. 25 I-R Portable Sump Pump

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